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1921-22

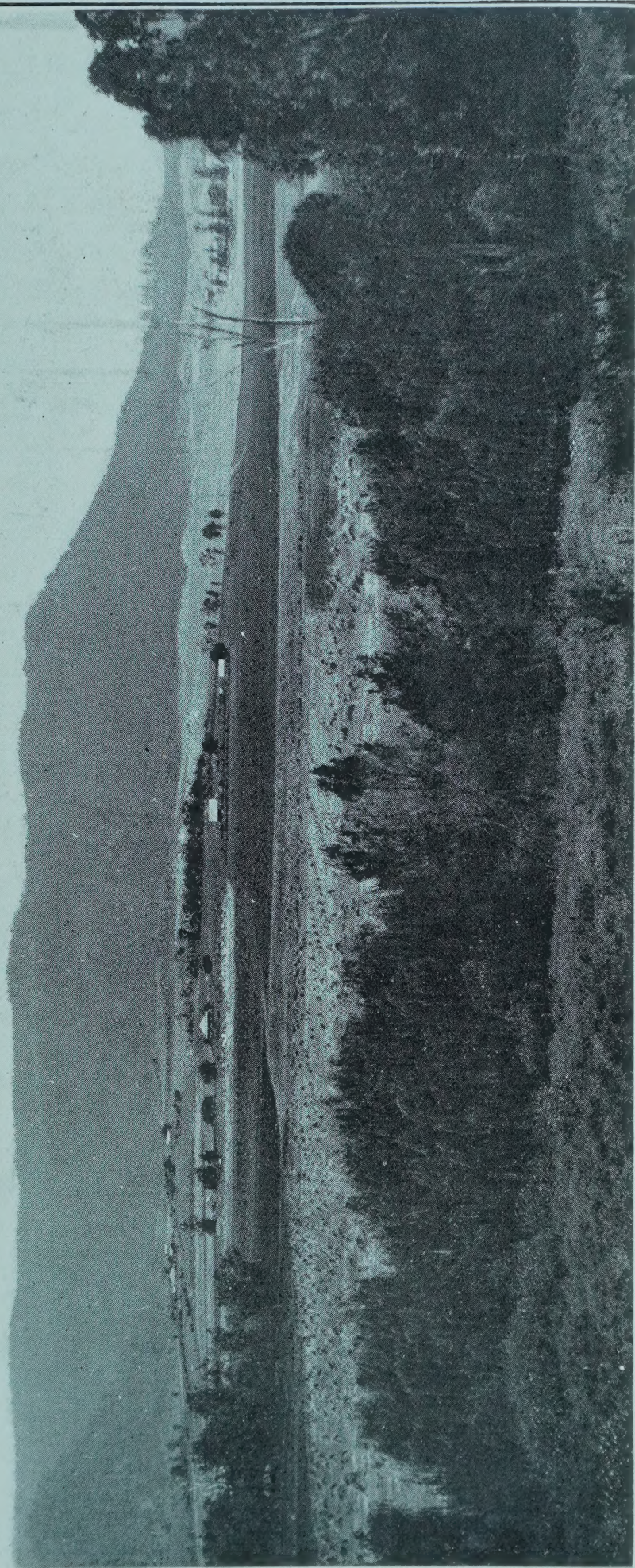


PLATE 1.—WHEATFIELDS AND HOMESTEADS, YANGAN VALLEY, DARLING DOWNS, 1921.

QUEENSLAND AGRICULTURAL JOURNAL

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PART I.

THE 1921 WHEAT SEASON.

By H. C. QUODLING, Director of Agriculture.

Another year has passed and another excellent crop of wheat has been garnered, now making two crops in succession which have proved to be bigger and better than any previously grown in the State. It is to be recognised that all primary products are subjected to a great deal of variation in price and, as a corollary, the producers are at times left with a very small margin of profit. However, the fact remains that wheat has done and is doing much to maintain Australia's financial position. In Queensland a distinct advance has been made. The 1920 crop proved to be a record one. Approximately 4,000,000 bushels of grain were

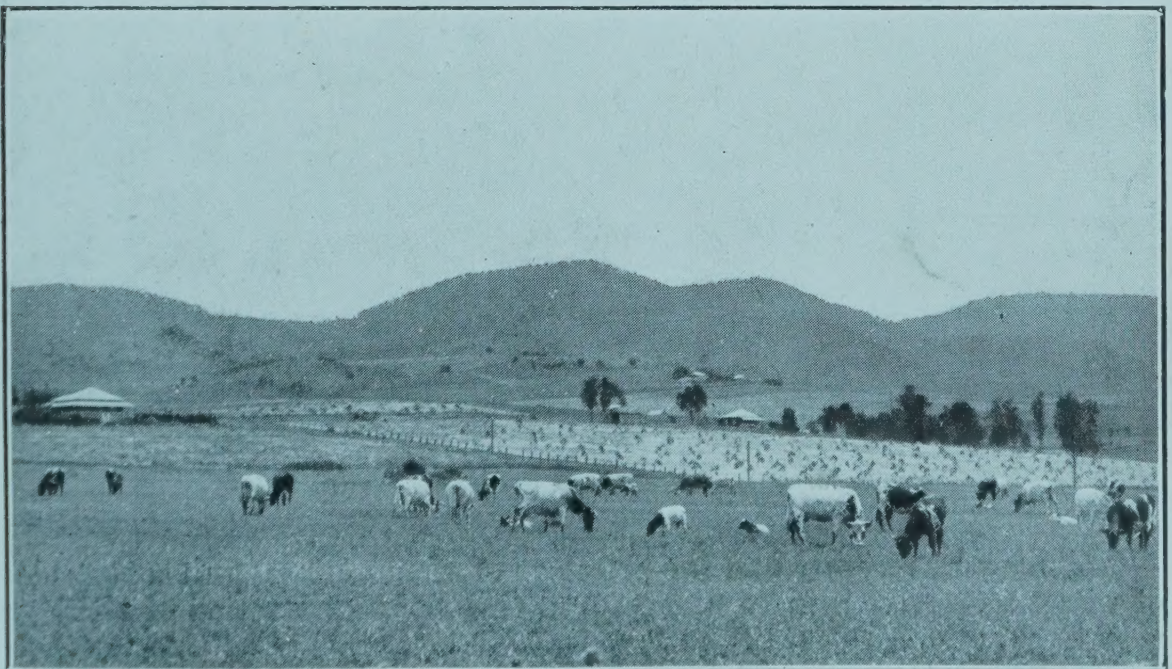


PLATE 2.—MIXED FARMING, KILLARNEY LINE, DARLING DOWNS.

harvested—more than sufficient to meet our own requirements—and an appreciable amount of wheat was exported. The crop was worth over a million sterling, and the average yield, 20.91 bushels per acre, was the highest in the Commonwealth.

The 1921 crop should approximate in quantity and average yield per acre that of the previous season. Although prices are not likely to be high, the quality of the grain is admittedly superior to that of 1920, being hard, bright, translucent, and of good keeping and shipping quality.

Queensland's position in respect to wheatgrowing is not circumscribed, as it is in many southern districts; here the grower has the choice of quite a variety of crops, and dairying, pig- and sheep-raising are commonly practised on wheat farms. In a sense, the soil is so productive that one is apt to overlook the fact that immense tracts of land still await development. The present is a fitting period for every patriotic Queenslander to take up a new slogan—"Wheat!" In this respect the words of "Banjo" Paterson, in his "Song of the Wheat," supply an inspiration—

"Green and amber and gold it grows
When the sun sinks late in the West;
And the breeze sweeps o'er the rippling rows
Where the quail and skylark nest.
Mountain or river or shining star,
There's never a sight can beat—
Away to the skyline stretching far—
A sea of the ripening wheat."



PLATE 3.—"A SEA OF THE RIPENING WHEAT."

Those who recently had the privilege of seeing our magnificent fields of wheat have spoken in no unmeasured terms of appreciation of all that they stand for. Others, not so favourably situated, may be able to form some idea at least of everyday scenes during harvest time from the series of illustrations presented with this article.



PLATE 4.—TYPICAL WHEAT COUNTRY, DARLING DOWNS.



PLATE 5.—HARVESTING “FLORENCE” WHEAT, ALLORA.

Last year was the first occasion wheat was marketed on co-operative lines under the 1920-21 Wheat Pool Bill, a measure which enabled growers to receive the fullest possible value for their grain, and it is a significant fact that a majority of these growers voted for a continuation of the Pool, which is now being carried on under the same chairman and manager; but three out of five members of the elected “Board” are recent nominees.



PLATE 6.—FIELD WORK, AFTER MORNING TEA, ALLORA.

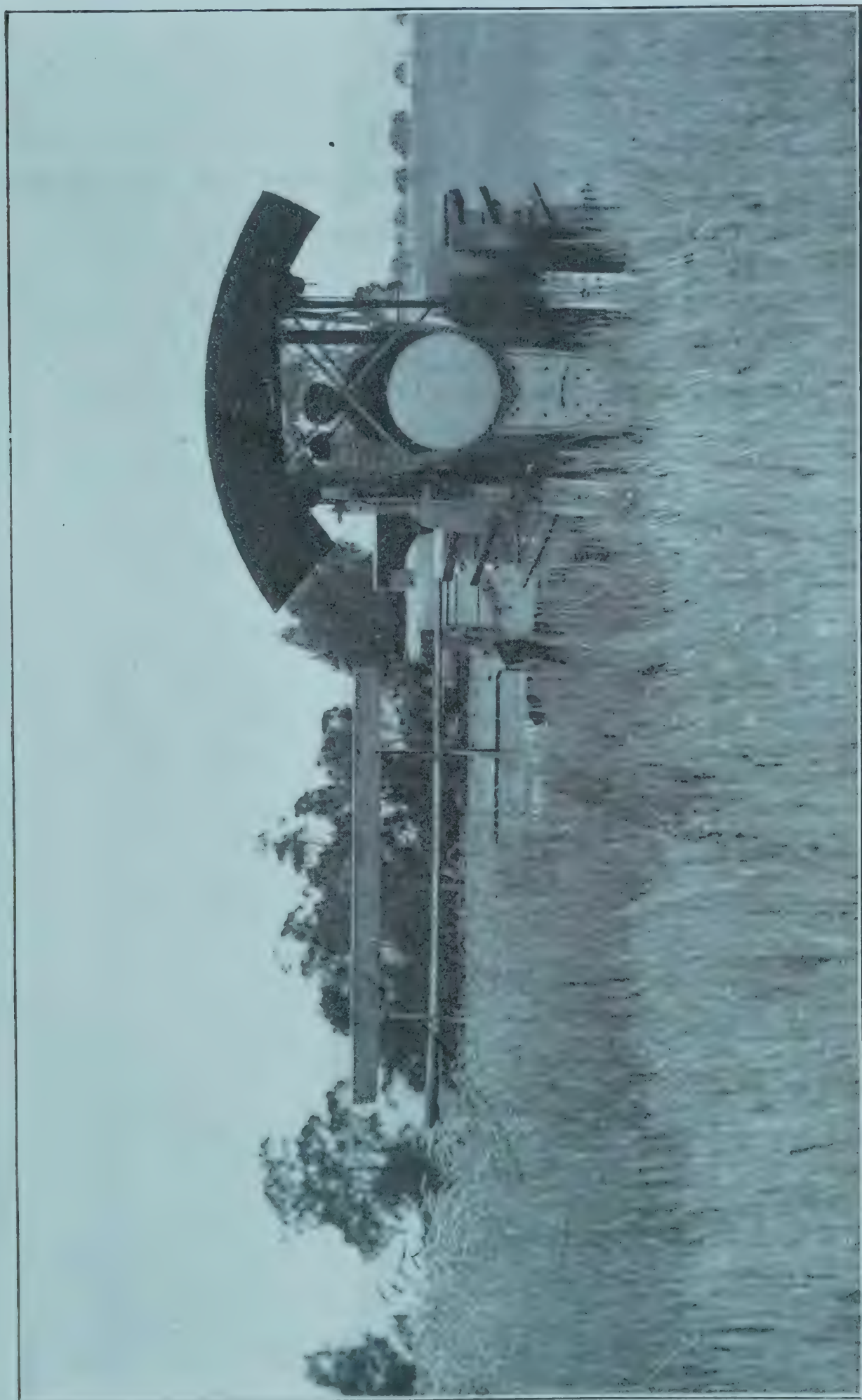


PLATE 7 —TRACTOR-DRAWN REAPER-THRESHER TAKING OFF A 10-BAG CROP OF "PIASTRE" WHEAT, MR. C. DAVENEY'S FARM, MOUNT STURT.

A review of the season indicates that it was generally favourable for production, and although storms and hail beat down the ripening wheat in some localities, the losses were much less than those occasioned by these causes to the preceding crop. Damage was done in a few places by a visitation of caterpillars and grasshoppers (locusts), but these pests appeared late in the season, and this circumstance somewhat curtailed the period of their depredations. A heat wave also reduced the natural succulence of the plants, and, although causing premature ripening of crops, it had an effect of depriving the insects of soft, palatable food.

“Flag” rust was in evidence in most crops; subsequent damage, however, by the more harmful form of rust which attacks the stem of the plants was restricted to varieties susceptible to attack, and to crops which were either too succulent or had lodged on rich patches of soil.

The rains necessary for germinating seed were delayed until the second week of June. Harvest prospects, however, proved so encouraging that numerous orders for modern harvesting machinery were placed by growers who are keeping abreast of the times in the matter of labour-saving appliances, it being generally recognised that success can only be attained by keeping down the cost of production.

Wheat ripens earlier in Queensland than in any of the Southern States. In the neighbourhood of Mitchell and Roma it is often in the bag by the second week in October; this season the harvest proved a little later than usual and commenced about the last week of that month. Quick-maturing wheats were being harvested throughout the Darling Downs at the latter end of the first week of November. These, and the main crops were removed under fairly satisfactory harvesting conditions, but wind storms and hail affected some late-harvested areas.



PLATE 8.—A BUSY SCENE, CLIFTON RAILWAY STATION.

Taking all things into consideration, the reduction in the aggregate amount of wheat harvested, due to various disabilities, amounted to only a small percentage.

Busy scenes are to be witnessed at all centres where deliveries of grain are being made, and although the "stripper" of "Banjo's" day has given place to the more economical and modern system of harvesting by means of the present day "reaper-thresher," his words, in the following lines, carry a world of meaning:—

"When the burning harvest sun sinks low,
And shadows stretch on the plain,
The roaring strippers come and go
Like ships on a sea of grain,
Till the lurching, groaning waggons bear
Their tale of the load complete.
Of the world's great work he has done his share
Who has garnered a crop of wheat."

A retrospective view of the history of wheatgrowing in Queensland indicates great variation in yield and in the aggregate area annually put under crop.

For a number of years the average yield, over a ten years period, was slightly in excess of other wheatgrowing States in the South, and the distinction of attaining the highest average yield per acre for any one year, with 20.91 bushels per acre, belongs to Queensland; however, the mean for the last decade now places this State third on the list, a position brought about by three abnormally dry years—1911, 1915, and 1918.

The mean for ten years is shown hereunder—

	Per acre.
Victoria	11.91 bushels.
New South Wales	10.67 bushels.
Queensland	10.40 bushels.
South Australia	10.35 bushels.
Western Australia	8.91 bushels.

It is generally recognised that the soils on the major portion of the area cropped with wheat—the Darling Downs—are deeper than they require to be, and are also, if anything, too rich for the crop; moreover, that better and more consistent results would be attained if systematic effort were made in all farming operations to trap and conserve moisture, particularly the summer rains, which, after percolating to the subsoil, can be largely stored there for the benefit of subsequent crops. Proof of what is possible in a dry year may be instanced from a crop of "Warren" wheat which yielded a few seasons ago 24 bushels to the acre at the Roma State Farm, on an effective rainfall of only 1.76 in. during the growing period of the crop. Prior to planting the seed, good summer rains fell. Success is to be attributed to the fact that the whole of the cultivation was directed towards putting the ground into condition to receive a maximum amount of moisture, and holding it there by the maintenance of a well-worked soil mulch.



PLATE 9.—FALLOWING LAND AT ROMA WHEAT-BREEDING FARM, MARANOA DISTRICT.

If the possible failure of crops were to be overcome by evolving a wheat to withstand dry conditions, the matter of obtaining suitable varieties would be a matter of rigid selection of hardy types with a deep-rooting system and certain other essential botanical characteristics. Here, however, climatic conditions are variable, and at times conducive to rust, particularly in good seasons, when over-succulent crops are the rule, which latter form an ideal host for the propagation of rust spores; consequently, it was only to be expected that, whilst rust-labile wheats remained in cultivation, heavy losses were inevitable. Twenty-five years ago the Department of Agriculture and Stock, seized with the importance of bringing more suitable varieties into general cultivation which would combine rust-resistance and desirable field characteristics with grain of good milling and nutritive qualities, decided on a policy calculated to bring about the desired result.

Wheats were introduced from countries in different parts of the world and tested on farms, principally on the Darling Downs. It is of interest in this connection to recall the fact that "Marquis," a strong flour, red Fife type of wheat, was imported by the Department more than a decade ago, and is now favoured in a number of localities for mid-season sowing. The scheme of importing special kinds of grain and testing them had its limitations, and, in consequence, a more systematic effort was made to co-ordinate the work, to collect data concerning the behaviour of introduced wheats, and to admit of their classification and correct nomenclature and the control and distribution of varieties that had proved suitable. Two State farms were established—one at Westbrook, near Toowoomba, and another at Hermitage, near Warwick. Wheat improvement and experiment work were initiated at these institutions. Certain tests were also carried out in co-operation with Southern

Agricultural Departments. Later on, all the wheat selection work was transferred to Hermitage. It was soon found necessary to extend the scope of operations, and to test special wheat selections made at the farm on different soils, under variable climatic conditions. This field plot work, in conjunction with Departmental laboratory and milling tests, afforded more scope and was the means of introducing a number of valuable varieties into cultivation. Notable wheats from this source now found more or less in the principal wheatgrowing districts are "Amby," "Bunge," "Piastre," "Coronation," "Hiawatha," and "Hermitage Nos. 1 and 2."



PLATE 10.—A FIELD OF "HERMITAGE NO. 1" WHEAT, ALLORA.
YIELD, 11 BAGS PER ACRE.

The necessity arose for the establishment of another permanent establishment at Roma, where wheatbreeding and cultural tests could be carried on under drier conditions common to localities considered to be well suited for wheat production.

For the last twelve years careful and systematic work has been effected. A similar system to that previously referred to, of establishing field test plots, was continued, with the result that some excellent varieties have been added to wheats now in cultivation. Some of the newer varieties include "Soutter's Early," "Inglewood," "Patriot," "Cedric," and "The Prince."

Many of these new varieties from Hermitage and Roma State Farm have found favour with wheatgrowers; good yields, ranging from 7 to 12 bags (3 bushels each) of wheat were harvested from fairly large fields. Facts of this character show an accomplishment of purpose which is exercising a healthy influence in the choice of wheats suited to Queensland conditions. Work of this latter description is being vigorously carried on, and quite a number of new "crossbreds" evidence a capacity to mature quickly and escape rust, whilst others are equally promising in respect to rust-resistance.

Apart from Departmental varieties of wheat, several other kinds are commonly met with and find favour amongst growers, according to varying conditions of soil and climate and their relative sowing periods

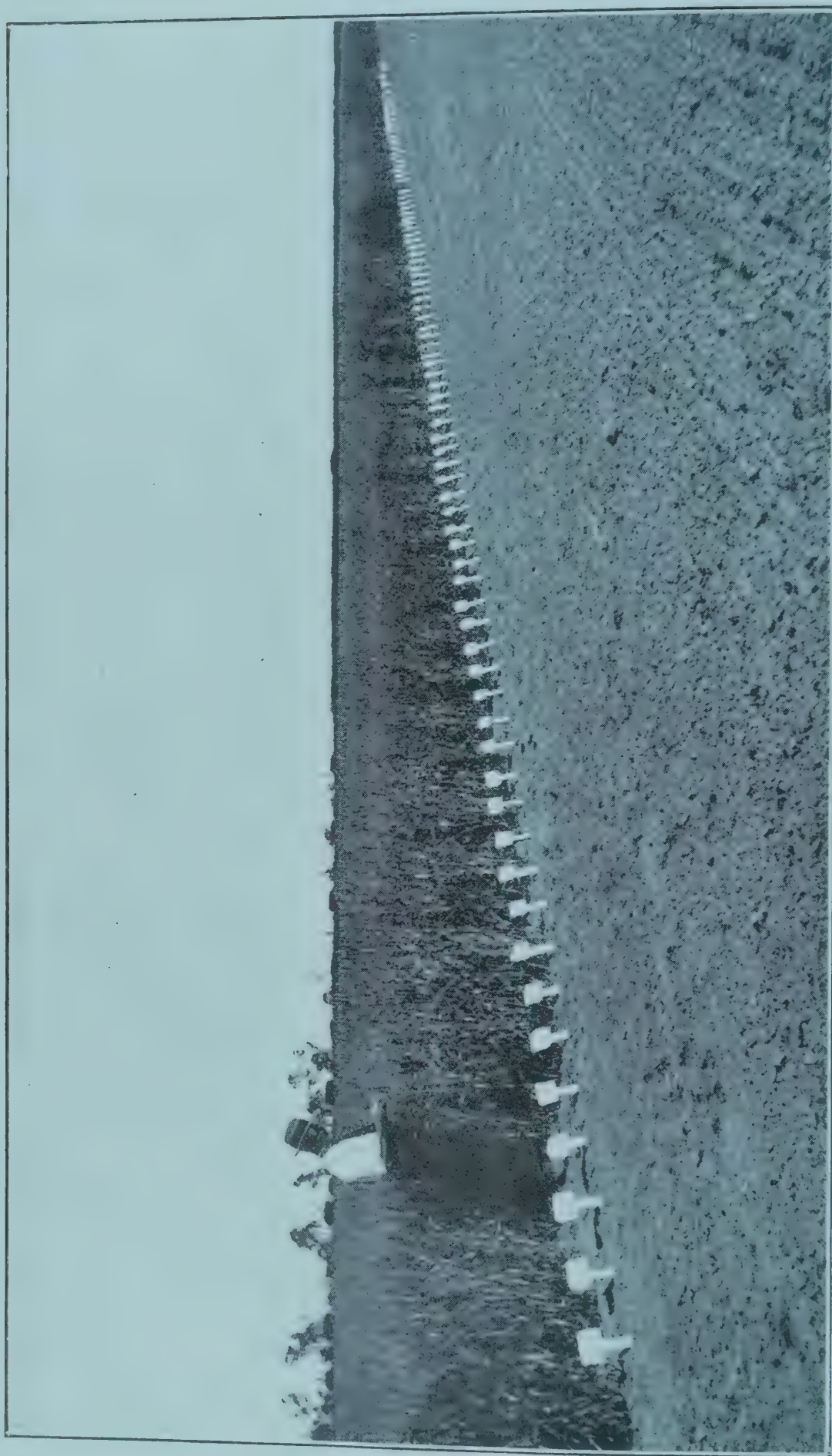


PLATE 11.—ROMA WHEAT-BREEDING FARM, MARANO DISTRICT.

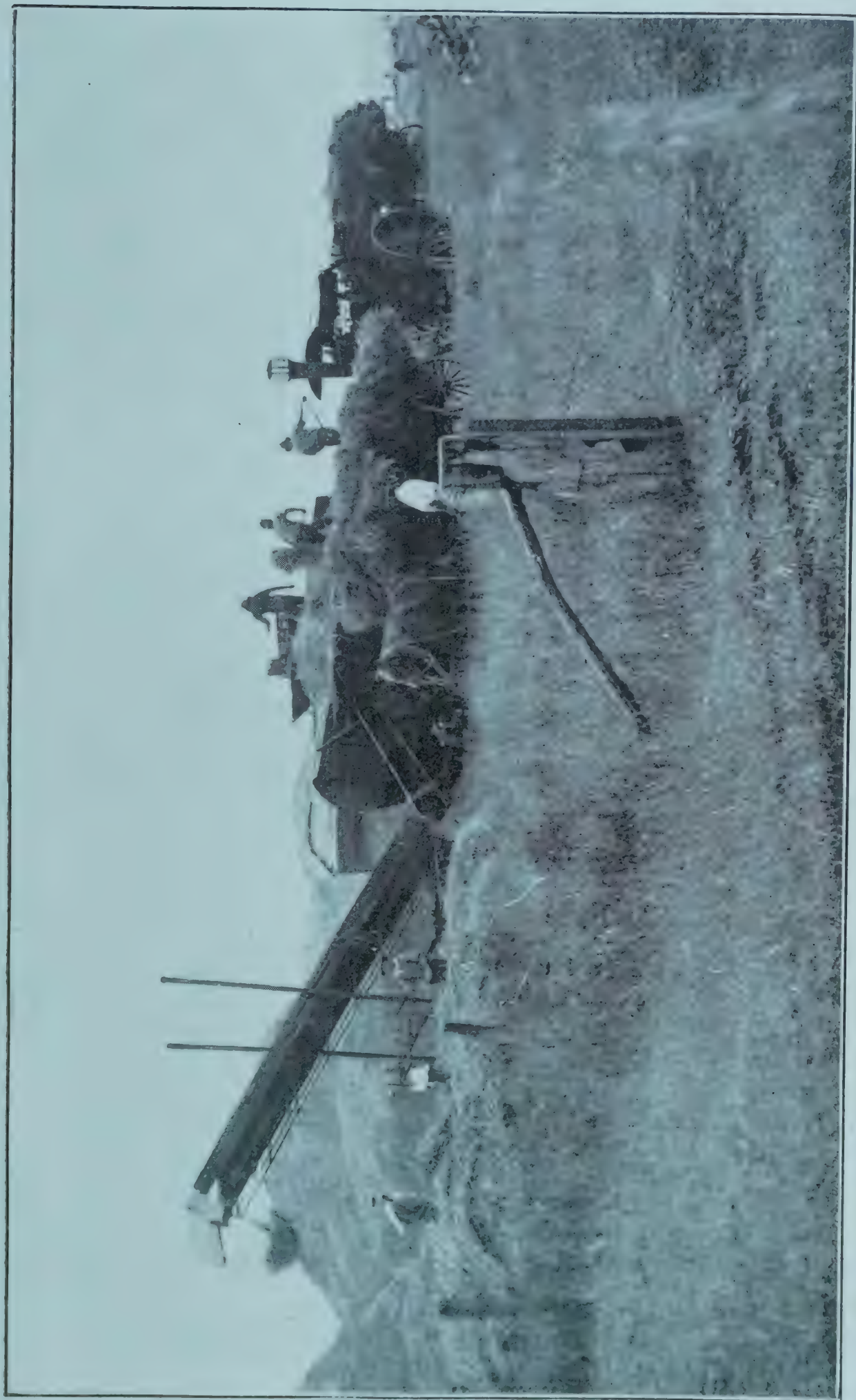


PLATE 12.—THRESHING FROM THE STOOK, NOBBY, DARLING DOWNS.

during the season. Chief of these are "Florence," "Comeback," "Marquis," "Cedar," "Cleveland," "Warren," "Gluyas," and "Currawa." Such a thing as a perfect variety of wheat to meet all conditions is practically unattainable. However, mention should be made of the adaptability to Queensland conditions shown by "Florence," a New South Wales variety. It is bunt- and rust-resistant, possesses a firm, fairly strong straw, and is a quick maturer. These excellent qualities outweigh other disabilities in the way of susceptibility to frost and a tendency of the grain to "shatter."

Excellent characteristics may also be claimed for many of the newer wheats introduced by the Department of Agriculture in Queensland.* Obviously, growers will advance their own interests by testing some, at least, of these, by sowing them at seasonable periods to determine whether such, or any variety, is superior to the varieties commonly grown.

Favourable seasons naturally account for a great deal in the production of all crops, but success in the main is only to be won by the indomitable will of the wheatgrower, whose outlook on life Mr. C. J. Dennis crystallises in his "Backblock Ballads":—

"When the settin' sun is gettin' low above the western hills,
When the creepin' shadows deepen, and a peace the whole world fills,
Then I often sort o' soften with a feelin' like content,
An' I feel like thankin' Heaven for a day in labour spent,
For my father was a farmer, an' he used to sit an' smile,
Realizin' he was wealthy in what makes a life worth while.
Smilin', he has told me often, 'After all the toil an' heat,
Lad, he's paid in more than silver who has grown one field of wheat.'

"Wheat, Wheat, Wheat! When it comes my turn to meet
Death the Reaper, an' the Keeper of the Judgment Book I greet,
Then I'll face 'em sort o' calmer with the solace of the farmer
That he's fed a million brothers with his Wheat, Wheat, Wheat."



PLATE 14.

"An' I feel like thankin' Heaven for a day in labour spent, with a feelin' like content,"

* Approximately a million bushels of wheat were harvested in 1920 from varieties raised and brought into cultivation by the Department of Agriculture and Stock.—Ed.

SOME NOTES ON THE SOILS AND FOREST FLORA OF THE DIVIDING RANGE—NORTH OF ROMA.

BY H. I. JENSEN, D.Sc. (SYD.).

(Continued from December "Journal.")

WESTGROVE—GLENHAUGHTON COUNTRY.

Between Injune Creek and the Carnarvon Range lies an expanse of country, most of which has been or is part of Westgrove Station. Between the Expedition Range and Taroom lies an expanse divided up into several cattle stations, principal of which is Glenhaughton.

These two areas, which we name after the principal stations on them, are very similar in nature, consisting of "Bundamba" sandstones in the northern parts, passing into Lower "Walloon" rocks of a highly calcareous nature in the southern and south-eastern parts.

The country met with in these two areas has a somewhat better rainfall, and possesses more coastal climatic conditions than the areas already described. As a result of this we get the soils more leached than the equivalent soils in other areas mentioned above, and the timber is a curious mixture of coastal and inland species.

The "Bundamba sandstone" soils are naturally a shade better on Westgrove than on Glenhaughton, owing to climatic differences and leaching conditions, but both are poor areas, not at all well suited for subdivision into small grazing selections. It is country like that of the Brown basin and Upper Nogoia one would like to see subdivided.

The "Bundamba" soils (sandstone) on Glenhaughton are so leached and poor that they are quite similar to our Bundamba sandstone areas in coastal parts, near Brisbane. They are so poor and sandy that the prickly-pear seldom transgresses on to the area, and will not spread across it; it is as effective a barrier to pear as the sandy sandstone soils of the Burpengary district are to the prickly-pear patches on the coast. This great sandstone area reminds one greatly of the Blue Mountains district of New South Wales in scenery, soil, climate, and vegetation. In the flowering season it contains a marvellous display of flowers like the sandy plateaux of the Blue Mountains. The forest trees include a profusion of acacias, amongst which the following are very abundant:—*A. Cunninghamii*, *A. Bancrofti*, *A. juncifolia*, *A. flavescens*, *A. polybotrya*, and *A. neriifolia*. Amongst the eucalyptus species we have ironbarks (*E. decorticans*, *E. melanophloia*, narrow-leaved var., *E. crebra*, not common, spotted gum (*E. maculata*), also var. *citriodora* (lemon scented), crooked or tumble-down gum (*E. dealbata*), Moreton Bay ash (*E. tessellaris*), -stringybark (*E. acmenioides?*), bloodwood (*E. terminalis*), yellowwood (*E. Watsoniana*), and yellow bloodwood (*E. trachyphloia*). Pine (*Callitris glauca*) occurs in belts. Dogwood (*Jacksonia*), stunted trunkless zamia, quinine (*petalostigma*—a tree variety, quadriloculare, and a low shrubby variety), boronia, &c., are also conspicuous. Hoveas, hardenbergias, grevilleas, hakeas, ricinocarpus, pultenea, and other genera were identified by Mr. White. Oak (*camarina torulosa* and *C. inophloia*), budgeroo (*Lysicarpus*), are also common. Finally, *Tristania suaveolens*, a coastal timber (swamp mahogany) is fairly abundant.

The "Walloon" shales and sandstone area of the Taroom district has excellent calcareous soils, similar to those already described for Injune Creek and Durham Downs, north of Roma. These soils are heavy black, brown, and chocolate soils, with brigalow-belar scrubs, patches of open plain; myall (*Acacia pendula*), wilga (*Geijera parviflora*, sandalwood (*Eremophila Mitchelli*) are also common in association with brigalow (*A. harpophylla*) and belar (*Casuarina lepidophloia*), or in belts by themselves, and bauhinia, together with *Cadellia pentastylis* (ooline or Taroom solidwood) are abundant in the same thickets. These trees are uncommon in the Injune Creek brigalow scrubs. In some of the Taroom scrubs we also see a considerable admixture of the plants belonging to the coastal scrubs. This is particularly the case in the range between Broadmere and Glenhaughton, where the scrubs are partly on soils derived from volcanic trachyte flows capping the summits. Throughout this rich-soiled area the prickly-pear is spreading with most alarming rapidity. The country, but for this fact, would be most attractive dairying and agricultural land.

Another belt of geological formations occurring north of the "Bundamba" sandstone belt in these areas is the belt of "Ipswich" formations, which is divisible into—

- (a) The shales, limestones, and calcareous sandstones with typical calciphile flora and rich heavy soils in which prickly-pear is rampant, and where on the forest areas we get Moreton Bay box (*Tristania conferta*), molly box (*Eucalyptus cambageana*), and poplar box (*E. populifolia*); and

- (b) The sandstones of the same series, which are of a micaceous-felspathic nature, with good and light loamy soils suited for agriculture, where the country is not too rough and timbered with spotted gum (*E. maculata*), silverleaf ironbark (*E. melanophloia*), and tree zamia (*Macrozamia Moorci*).

These belts are found in the area at the head of the Robertson, Roper Pass, Ruined Castle Creek, and Bedourie.

THE DRUMMOND RANGE.

The rocks of the star formations at Bogantungan and on the tributaries of the Nogoa and Belyando, in the Drummond Range district, are divisible into an upper calcareous shale series and a lower sandstone series. The former series yields good pastoral country, timbered chiefly with silverleaf and narrowleaf ironbark; the latter is poor sandy country with the usual calciphile flora ironbark (*E. siderophloia* and *E. crebra*), sugar gum (*Angophora lanceolata*), Moreton Bay ash (*E. tessellaris*), yellow bloodwood (*E. trachyphloia*), quinine (*petalostigma*), &c.

On the flats where the soils mix we get the yellow-jacket (*E. Watsoniana*), bloodwood (*E. terminalis*), and the cabbage gum (*E. papuana*). There is no particularly good country in the Drummond Range as far as I have been, since the calcareous strata through the roughness of the country yield only shallow soils. The soils are exceedingly dry. The same belt where it occurs on more level country should yield fair soils.

Much more could be said, but all I desire is to emphasise the fact and add some more data in proof of the contention that this subject is important both to agriculture and forestry.

TABULATION OF FLORA COLLECTED BY JENSEN AND DUNLOP; DETERMINED BY MR. WHITE, GOVERNMENT BOTANIST; GEOLOGICALLY CLASSIFIED.

CALCAREOUS WALLOON COUNTRY AND CALCAREOUS SOILS, IPSWICH-BUNDAMBA JUNCTION.

Calciophile Vegetation.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Eucalyptus melanophloia</i> ..	Silverleaf ironbark ..	Widespread	On stony ground
<i>E. populifolia</i>	Broadleaf box	Widespread	On heavy soil
<i>E. tessellaris</i>	Moreton Bay ash	Uncommon	Chiefly on sandy areas
<i>E. dealbata</i>	Tumbledown gum	Cornwall, &c.	On sandy soils
<i>E. rostrata</i>	River gum	Common	Along watercourses
<i>Acacia Cunninghamiana</i> ..	Wattle	Injune Creek and wide-spread	On loamy soils
<i>A. Bancroftii</i>	Wattle	Jack's Mountain (rare)	In brigalow-belar scrub
<i>A. homalophylla</i>	Narran	Jack's Mountain and Orallo	In brigalow-belar scrub
<i>A. harpophylla</i>	Brigalow	Very widespread ..	
<i>A. decora</i>	Wattle	Kilmory, Injune Creek, &c. ..	Common on lime-rich soil
<i>A. pendula</i>	Myall	Myall Downs, Mount Hutton ..	Common on lime-rich flats
<i>A. dealbata</i>	Wattle		
<i>Casuarina lepidophloia</i> ..	Belar	Very widespread ..	On sandy calcareous loams
<i>Angophora intermedia</i> ..	Apple	Widespread	Along creeks
<i>Alphitonia excelsa</i>	Red ash, Whiteleaf ..	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Atalaya hemiglauca</i> ..	Whitewood	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Canthium oleifolium</i> ..	Orange	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Canthium buxifolium</i> ..	Orange	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Capparis Mitchellii</i> ..	Orange	Jack's Mountain, Box-vale, &c. ..	Common in brigalow-belar scrubs
<i>Capparis lasiantha</i> ..	Orange	Jack's Mountain (creeper)	Common in brigalow-belar scrubs
<i>Cassia australis</i>		Injune Creek	Common in brigalow-belar scrubs
<i>Carissa ovata</i>	Prickly turkey bush ..	Injune Creek, &c. ..	Common in brigalow-belar scrubs
<i>Cassinia lævis</i>	Rosemary	Jack's Mountain and Mount Hutton	Common in brigalow-belar scrubs
<i>Cassinia quinquefolia</i> ..	Rosemary	Injune Creek	Common in brigalow-belar scrubs
<i>Cassia eremophila</i>	Buttercup bush	Injune Creek	Common in brigalow-belar scrubs

Calciphile Vegetation—continued.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Dodonea triangularis</i> ..	Hop bush	Dawson River ..	Common in sandalwood country
<i>Dodonea viscosa</i>	Hop bush	Widespread	Common in sandalwood country
<i>Owenia audula</i>	Emu apple .. ..	.. ..	Common in brigalow-belar scrubs
<i>Notelaea punctata</i> .. ..	.. ..	.. ..	Common in brigalow-belar scrubs
<i>Neterodendrum olecefolium</i>	.. ..	.. ..	Common in brigalow-belar scrubs
<i>Olearia stellulata</i> .. ..	.. ..	.. ..	Common in brigalow-belar scrubs
<i>Eremophila Mitchellii</i> ..	Sandalwood	Widespread	More or less associated with belar and wilga
<i>Geijera parviflora</i>	Wilga	Widespread	With belar and sandalwood
<i>Alstonia constricta</i> ..	Peruvian bark ..	Kilmorey, Dividing Range	..
<i>Canthium oleifolium</i> ..	.. ..	.. ..	..
<i>Notelaea microcarpa</i> ..	.. ..	.. ..	..
<i>Hovea longifolia</i> .. ..	.. ..	Injune Creek .. ..	..

VERY SANDY WALLCON COUNTRY. SILICIOUS BELTS AND BUNDAMBA SANDSTONES.

Calciphobe Plants.

<i>Eucalyptus dealbata</i> ..	Tumbledown gum ..	Cornwall and Orallo ..	..
<i>E. tessellaris</i>	Moreton Bay ash ..	Cornwall and Orallo ..	..
<i>Angophora intermedia</i> ..	Apple	Cornwall and Orallo ..	..
<i>A. lanceolata</i>	Rusty gum	Cornwall and Orallo ..	..
<i>Acacia macradenia</i> ..	Strangle wattle ..	Dividing Range and Dawson River	..
<i>A. excelsa</i>	Ironwood	Durham Downs ..	Eurombah Creek and Frankvale Creek
<i>Hovea longipes</i> .. ..	.. ..	Widespread .. ..	..
<i>Grevillea striata</i>	Beefwood	Widespread .. ..	..
<i>Petalostigma quadriloculare</i>	Quinine	Widespread .. ..	..
<i>Callitris glauca</i>	Cypress pine	Widespread .. ..	..
<i>Exocarpus cypressiformis</i> ..	Cherry	Widespread .. ..	..
<i>Jacksonia scoparia</i>	Dogwood	Widespread .. ..	..
<i>Eucalyptus Siderophloia</i> var. <i>decorticans</i>	Ironbark	Kilmorey	Confined to high rough sandstones
<i>E. crebra</i>	Narrow-leaf ironbark ..	Dawson River to Jack's Mountain	..
<i>Citriobatus pauciflorus</i> ..	Orange	Sandstone Hills ..	At Dawson River
<i>Prostanthera ringens</i> ..	.. ..	Kilmorey	Rough sandstone
<i>Bossia rhombifolia</i> .. ..	.. ..	Dawson River, &c. ..	Rough sandstone
<i>Leucopogon biflorus</i> .. ..	.. ..	Dawson River, &c. ..	Rough sandstone
<i>Acacia doraloxylon</i>	Lancewood	Dawson River, &c. ..	Rough sandstone
<i>A. Burrowi</i>	Wattle	Dawson River, &c. ..	Rough sandstone
<i>A. buxifolia</i>	Wattle	Walleroo Creek ..	Rough sandstone
<i>Hovea longipes</i> .. ..	.. ..	Kilmorey	Rough sandstone
<i>Acacia decora</i>	Wattle	Kilmorey	Rough sandstone
<i>A. decurrens</i> , var. <i>dealbata</i> and var. <i>mollens</i>	.. ..	Kilmorey	Detrital sands
<i>A. podalyriæfolia</i>	Silver wattle	Kilmorey	Detrital sands
<i>Myoporum</i> sp. .. ..	.. ..	Westgrove	Sandstone
<i>Casuarina inophloia</i>	Stringybark oak ..	Dawson River ..	Rough sandstone
<i>Lysicarpus termifolius</i> ..	Stringybark mermate or Budgera	Dawson River ..	Rough sandstone
<i>Xylomelum pyriforme</i> ..	Pear	Dawson River ..	Rough sandstone
<i>Invigofera australis</i> ..	Poison bush	Dawson River ..	Rough sandstone
<i>Thryptomene</i> sp. .. ..	.. ..	.. ..	..
<i>Cassinia laevis</i>	Rosemary	Dawson River ..	Rough sandstone
<i>Dodonea triangularis</i> ..	Hop bush	Dawson River ..	Rough sandstone
<i>Cassia Eremophila</i>	Buttercup bush ..	Dawson River ..	Rough sandstone
<i>Acacia Cunninghamii</i> ..	Wattle	Baffle Creek	Rough sandstone

IN WET PLACE ON POOR SANDSTONE COUNTRY (MOSTLY ARENOPHILE).

<i>Angophora intermedia</i> ..	Apple	Dawson River and Baffle Creek	..
<i>A. lanceolata</i>	Sugar gum	Dawson River and Baffle Creek	..
<i>Callistemon viminalis</i> ..	Red bottle brush ..	Dawson River and Baffle Creek	..
<i>Leptospermum flavescens</i> ..	Tea tree	Dawson River and Baffle Creek	..
<i>Melaleuca lencodendron</i> ..	Paper-barked or broad-leaved tea tree	Dawson River and Baffle Creek	..
<i>Acacia Macradenia</i>	Strangle wattle ..	Dawson River and Baffle Creek	..

NEAR JUNCTION OF IPSWICH AND BUNDAMBA SERIES, CARNARVON RANGE.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Eucalyptus maculata</i> ..	Spotted Gum ..	Carnarvon Range ..	Sandy soil
<i>E. acmenioides</i> ..	Stringybark ..	Carnarvon Range ..	Sandy soil
<i>Macrozamia</i> sp. ..	Burrawang ..	..	..
<i>E. hemiphloia</i> ..	Gumtop box ..	Carnarvon Range ..	Sandy soil

PLANTS COLLECTED BY H. I. JENSEN NORTH OF THE MAIN DIVIDING RANGE (GEOLOGICALLY CLASSIFIED).

Calciphile Plants.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Cadillia pentastylis</i> ..	Ooline ..	Taroomb district ..	On calcereous Walloon
<i>Acacia harpophylla</i> ..	Brigalow ..	Taroomb, Bedourie, Brown and Nogoa Valleys	On calcereous Walloon, Ipswich, and both Upper and Lower Bowen limestones
<i>Alphistonia excelsa</i> ..	Red ash ..	Broadmere, Glenhaughton Range	Volcanic soils
<i>Owenia venosa</i> ..	Crow's apple ..	Broadmere, Glenhaughton Range	Volcanic soils
<i>Hoya australis</i> ..	Snake vine ..	Broadmere, Glenhaughton Range	Volcanic soils

Also baubinia, belar, and most of the calciphile plants mentioned for the Ipswich-Bundamba south of the Main Range.

<i>Eucalyptus microthica</i> ..	Coolibar ..	Nogoa and Brown River Tributaries	Mainly on alluvial soils
<i>E. hemiphloia</i> ..	Gumtop box ..	Nogoa and Brown River Tributaries	Mainly on basalt soils

REQUIRING GOOD, HEAVY LOAM.

<i>Eucalyptus melanophloia</i> ..	Silverleaf ironbark ..	Calcareous loams ..	Good drainage required
<i>E. tereticornis</i> ..	Red gum ..	Along River and Creek flats generally	All formations, but on alluviated ground
<i>E. Cambageana</i> ..	Molly box ..	Bedourie, Clematis Creek, Jack's Mountain, Walangara Creek, &c.	Ipswich formation calcareous sandstone
<i>E. popellifolia</i> ..	Poplar box ..	Bedourie, Clematis Creek, Jack's Mountain, Walangara Creek, &c.	Ipswich formation calcareous sandstone
<i>Acacia podalyriæfolia</i> ..	Silver wattle ..	Bedourie, Clematis Creek, Jack's Mountain, Walangara Creek, &c.	Ipswich formation calcareous sandstone
<i>Tristania suaveolens</i> ..	Swamp mahogany ..	Widespread; Springsure to Taroomb	On moist heavy soils
<i>Tristania conferta</i> ..	Moreton Bay box ..	At intervals over same area	On dry but good loams

CALCIPHOBIC SPECIES—ALL ON SANDSTONE COUNTRY.

* <i>Acacia Bancroftii</i> ..	Wattle ..	Widespread ..	Silicious sandstones of Bundamba age
<i>A. neriifolia</i> ..	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
* <i>A. Cunninghamii</i> ..	Wattle ..	Widespread ..	Silicious sandstones of Bundamba age
† <i>A. polybotrya</i> var. <i>folio'osa</i>	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. flavescens</i> ..	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
<i>A. complanata</i> ..	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. argentea</i> ..	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. juncifolia</i> ..	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. brevifolia</i> ..	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. conferta</i> ..	Wattle ..	Glenhaughton ..	Silicious sandstones of Bundamba age
<i>A. podalyriæfolia</i> ..	Wattle ..	Walangara Creek, Mount Hope	Mixed soils

* These species occur on Bundamba, Upper Bowen, Middle Bowen, and other silicious sandstones.
 † Coastal species.
 ‡ Inland species.

CALCIPHOBIE SPECIES—ALL ON SANDSTONE COUNTRY—*continued*.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>A. salicina</i>	Black wattle	Clematis Creek ..	Sandstone, U. Bowen
<i>A. difficilis</i> .. .. .	.. ..	Clematis Creek ..	Sandstone, U. Bowen
<i>A. excelsa</i>	Ironwood	Clematis Creek ..	Alluvial patches
<i>A. doratoxylon</i>	Lancewood	Clematis Creek ..	Dry hill slopes with shallow ferruginous soils
<i>Casuarina torulosa</i> ..	Oak	Glenhaughton ..	Sandy dry country
<i>C. inophloia</i>	Oak	Glenhaughton, Clematis Creek, Moolayamber, Dawson River	Very sandy dry country
<i>Ricinocarpus Bowmanni</i> ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country.
<i>Grevillea juncifolia</i> ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Pultenea ternata</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Hovea longifolia</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Boronia ledifolia</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Hakea plurinervia</i>	Beefwood	Glenhaughton ..	On dry sandy sandstone range country
<i>Petalostigma quadriloculare</i>	Quinine	Glenhaughton ..	On dry sandy sandstone range country
<i>Cœlospermum reticulatum</i>	.. ..	Clematis Creek ..	Upper Bowen sandstone
<i>Heterodendron oleæfolium</i>	.. ..	Clematis Creek ..	.. ..
<i>Eucalyptus decorticans</i> ..	Ironbark	Clematis Creek, Glenhaughton, &c.	Dry sandstone mountains
<i>E. Muelleriana</i> .. ..	.. ..	.. ..	.. ..
<i>E. maculata</i> and <i>E. var. Atriadora</i>	Spotted gum	Meteor Creek and Clematis Creek	Ranges ..
<i>E. crebra</i>	Narrow leaf ironbark ..	Widespread .. ..	.. ..
<i>E. melanophloia</i> (narrow leaved variety)	Silverleaf ironbark ..	Widespread, but chiefly on better patches	.. ..
<i>E. dealbata</i>	Tumbledown gum ..	Glenhaughton, &c. ..	On poor sour country
<i>E. tessellaris</i>	Moreton Bay ash ..	Widespread	On deep sandy loams
<i>E. acmenioides</i>	Stringybark	Widespread	On dry sandy ridges
<i>E. Watsoniana</i>	Yellowjacket	Widespread	On deep sandy soils
<i>E. terminalis</i>	Bloodwood	Widespread	On sandstone alluvials
<i>E. trachyphloia</i>	Yellow-wood	Widespread	On dry but deep sandy soils
<i>Angophora lanceolata</i> ..	Sugar gum	Widespread	On deep sandy soils
<i>A. intermedia</i>	Apple	Widespread	On alluvial loams
<i>E. rostrata</i>	River red gum ..	Nogoa region	On fair loams
<i>Lysicarpus termifolius</i> ..	Budgeroo tree	Widespread	On dry sandy ridges and tablelands
<i>Xylomelum pyriforme</i> ..	Wooden pear	Widespread	With "boodgeroo"

Alluvials and deep detrital soils always have an abundance of apple (*Angophora intermedia*) and in the Nogoa and Brown River basins also cabbage gum (*Eucalyptus papuana*).

CONCLUSION.

The main utility of an investigation of this kind is, of course, in judging country by the timbers, and knowing what timbers to reafforest an area with from the nature of the soils. We will take a few instances to illustrate these points.

Take, first, the ironbarks. The narrowleaf (*E. crebra*) is so cosmopolitan in associations that it signifies little except dry, well-drained, and somewhat stony country. The silverleaf (*E. melanophloia*) must have calcareous and well-drained soil, good in plant food, and never waterlogged. It grows on the ridges with shallow but rich calcareous soil in the Stanthorpe district, in the Walloon belt north of Roma, and innumerable other places, but on Clematis Creek Gorge we find it along the watercourse in deep, alluvial loam. The lime attracts it here, and, though floods may sweep down the gorge, the run-off is so rapid that in a few days the soil is dry and sweet again. The mountain ironbark or gumtopped ironbark (*decorticans*) must have rocky, well-drained, and elevated sandy country to thrive. We only get it in the belts I have examined in such country. Here we get it associated with lancewood, budgeroo, &c., which have an affinity for similar country.

Take, now, lancewood (*Acacia doratoxylon*). This timber grows in similar situations to mountain ironbark, but chiefly where the sandstone is ferruginous. When the soil is pure silica sand we get with the ironbark (*decorticans*) budgeroo (*lysicarpus*) and stringybark (*E. acmenioides* with leaves like *Angophora intermedia*), and also the woolly oak (*Casuarina inophloia*).

In what has already been written, enough has been said to show what brigalow, belar, and poplar gum signify.

Sugargum (*Angophora lanceolata*) always seeks a deep, sandy loam—very poor in mineral plant food, but with high capillary power, but where such loams get richer in plant food we get Moreton Bay ash (*Eucalyptus tessellaris*) in similar looking soils. Both are associated with *Angophora intermedia* (apple), which is cosmopolitan to all loamy and sandy soils containing good water below, but in rich clay soils of alluvial origin it yields place to coolibar (*E. microtheca*). Tumbledown gum (*Eucalyptus dealbata*) grows in poor soils where the drainage is bad. Poplar box grows in rich soils where the drainage is inferior, but poplar box (*E. populifolia*) will also grow on higher country as long as it is a heavy and fairly good soil. With it the texture and chemical nature of the soil weighs more than drainage. The sandalwood (*Erremophila Mitchelli*) requires a soil good chemically, but impervious and inclined to be heavy and of great absorptive power for water, hence somewhat sour at intervals, but not necessarily alkaline, while brigalow seeks an alkaline soil.

Gumtop box (*E. hemiphloia*) usually means good soils inclined to be heavy loams and rich in plant food. It grows on basalt, limestone, and alluvial country, and requires good drainage; otherwise we get coolibar box instead.

These permutations and combinations can be considerably extended. It is a study which has both economic value and scientific interest to the natural historian. It is one in which geologists, botanists, forestry experts, surveyors, and agriculturists can collaborate and do good work.

SUDAN GRASS—A SORGHUM.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

About ninety years ago the then Sultan of Turkey was interested in the culture of cotton, and applied to the Governor of South Carolina for an instructor. Two or three years later the instructor returned to the United States of America and brought with him the seeds of a number of plants, among which was a kind of sorghum. An Alabama planter, Colonel Wm. Johnson, whilst on a visit to South Carolina, became interested in the new plant, and raised it extensively in the fertile lands of the Alabama River. Hence its name, Johnson Grass. Once established, it became almost impossible to kill it, because of its deep-running branching root stocks. But for the fact of its being a tropical plant, likely to be winter-killed where the ground freezes to any depth, it might have possessed the land to a greater extent.

When looking for an annual form of sorghum with the characteristics of Johnson, but without its persistent root stock, no better place for a search could be found than countries adjacent to the place from which Johnson was first obtained.

Recognising this fact, an organised search for forms lacking these root stocks was made by the United States of America Department of Agriculture, which in 1909 obtained from the Director of Agriculture at Khartoum a sorghum known to the natives as "Garawi." In order to give it distinctiveness, this was called "Sudan grass," by which name it is now popularly known.

Sudan grass has been described by Charles V. Piper, of the United States Department of Agriculture, as *Andropogon Sorghum*, var. *Sudanensis*, Johnson grass being known as *Andropogon halepensis*, and is distinguished from all other forms of cultivated sorghum by possessing underground root stocks, thus being truly perennial.

Recently a very thorough and scientific examination of tropical grasses was made at the Royal Botanic Gardens, Kew, London, and Mr. O. Stapf has revived the name of "sorghum" for this section of the *Andropogonæ*.

Sudan grass should therefore be known as *Sorghum Sudanense* Stapf.

Farmers would do well to realise that Sudan grass is a sorghum; the use of the botanic name *Sorghum Sudanense* will keep it before them, and may save considerable loss if the care required for sorghum is always used with Sudan.

The origin of the cultivated sorghums is a problem as yet undecided. The wild forms, however, are easily separated into two groups—namely, the perennials, with root stocks like Johnson, and the annuals, with fibrous roots only, such as Sudan and Tunis grass and kindred growths. The latter cross spontaneously with the cultivated sorghums, while the former are difficult to cross.

It is thus seen that Sudan grass (*Sorghum Sudanense*) is easily cross-fertilised by any of the cultivated sorghums, and when grown near any other variety a number of variants or rogues will appear. These rogues do no harm if the crop is for feed, but, in case of a crop intended for seed, the rogues must be pulled out. This should be done as soon as they can be distinguished, which would prevent further crossing

but cannot make the strain quite pure. Care should, therefore, be taken to sow seed from a true strain, and to go over the crop, pulling out all variants. Further, the seed must be grown in an isolated place, away from any other kind of sorghum.

On pages 7 and 8 of the "Queensland Agricultural Journal" for July, 1921, will be found an article on the poisonous glucosides sometimes found in sorghums. The article makes a special reference to both Sudan and Saccharine, and should be of more than passing interest to all farmers.

The different types of cultivated sorghums may be divided into three groups, based on the economic use of the crop:—

- (a) Saccharine sorghums.
- (b) Non-saccharine sorghums.
- (c) Broom corns.

Saccharine sorghums are those with abundant sweet juice, cultivated at one time principally for syrup manufacture and now as a forage plant. This group is referred to in the United States of America as "sorgo." Non-saccharine sorghums contain a scant juice, slightly sweet to subacid, grown principally for grain, but also as a forage plant. Broom corns are non-saccharine, pith-dry, grown for the brush, and are not valuable as a forage plant.

The standard of purity and germination, prescribed by the Regulations under the Pure Seeds Act, for sorghums, is:—

Inert matter (chaff, dust, broken seed, and all matter other than seed)—
2 per cent. by weight.

Seeds of weeds or seeds of any kind other than to which the sample purports to belong—1 per cent. by weight.

Dead and non-germinable seeds—25 per cent. by count.

In other words, the pure seeds contained in the sample must give a germination of 75 per cent., and the sample must not contain more than 2 per cent. of inert matter and 1 per cent. of foreign seeds.

The weed and other foreign seeds of most frequent occurrence in *Sorghum Sudanense* are:—

Datura stramonium (Thorn apple). All parts of this plant are poisonous, especially the seeds.

Xanthium spinosum (Bathurst burr).

Hibiscus trionum (Bladder ketmia).

Chenopodium sp. (Goosefoot or fat hen).

Panicum sanguinale (Queensland summer grass).

Sorghum vulgare (Sorghum).

Avena fatua (Wild oat).

Centaurea melitensis (A star thistle).

Bromus unioloides (Prairie grass).

Melilotus parviflora (Hexham scent).

Sida retusa (Sida weed).

Polygonum sp., *Setaria sp.*, *Apium sp.*

In the course of the last two years, a large number of *Sorghum Sudanense* samples have been examined at the seed laboratory, with the following results:—

Sixty samples in every 100 examined grew 75 per cent. or better.

Twenty samples in every 100 examined on account of impurities or low germination were classed as B grade.

Twenty samples in every 100 examined did not comply with the regulations under the Pure Seeds Acts, on account of impurities or low germination.

When it is considered that the standard for B grade sorghums is only 60 per cent. germination of pure seeds, and the amount of weed or other foreign seeds allowed 2 per cent., with 3 per cent. of inert matter, the figures give cause for grave reflection.

The best of seed-cleaning machinery cannot remove all impurities, and the seriousness of such pests as *Datura Stramonium* should be combated by those at the seat of the trouble—the farm where the seed was grown.

The recent loss of cows in the Goombungee district again directs attention to the fact that sorghums are sometimes poisonous; every grower should therefore remember that Sudan grass is a sorghum.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, NOVEMBER, 1921.

There was a decrease in egg production during the month. This can be accounted for by the extremely adverse weather conditions, the weather during the month being excessively hot, the temperature for days at a stretch being in the vicinity of 100 deg. in shade, and one day registering 106 deg. The result was that four deaths occurred, and several birds had to be removed to hospital for treatment. Broodies were extremely troublesome, the following being the only breeders competing in the heavy section who had only one broody:—Walters, Shanks, Singer, and Morris. Not a single heavy pen was free, and in some cases every bird in the pen was at one time out in the broody coops, some of them even twice. Those who lost birds during the month with the heat were:—Stacey, O. Goos, Oakleigh Poultry Farm, J. W. Newton, and W. Barron. The following are the individual records:—

Competitors.	Breed.	Nov.	Total.
LIGHT BREEDS.			
*J. M. Manson	White Leghorns ...	151	1,054
*W. and G. W. Hindes	Do.	144	1,044
R. Gill	Do.	125	1,028
*Mrs. R. Hodge	Do.	153	1,004
*G. Trapp	Do.	127	982
*H. Fraser	Do.	146	976
*T. Fanning	Do.	158	961
F. Birchall	Do.	118	955
*H. C. Towers	Do.	121	950
H. C. Thomas	Do.	116	948
*C. M. Pickering	Do.	134	947
Oakleigh Poultry Farm	Do.	123	935
*W. Becker	Do.	132	909
R. C. Cole	Do.	113	905
W. A. Wilson	Do.	115	900
*C. Goos	Do.	137	894
*J. W. Newton	Do.	121	884
*Thos. Eyre	Do.	139	881
*R. C. J. Turner	Do.	139	879
Mrs. E. White	Do.	126	876
W. Barron	Do.	118	859
*Thos. Taylor	Do.	131	865
M. F. Newberry	Do.	127	863
Bathurst Poultry Farm	Do.	113	862
*S. L. Grenier	Do.	133	859
*E. A. Smith	Do.	138	851
*E. Chester	Do.	118	847
H. Stacey	Do.	89	846
*G. Williams	Do.	130	842
*Mrs. L. Anderson	Do.	135	839
*B. Chester	Do.	116	838
J. W. Short	Do.	130	836
O. C. Goos	Do.	108	806
*Haden Poultry Farm	Do.	129	804
Mrs. E. Z. Cutcliffe	Do.	105	796
*H. P. Clarke	Do.	131	783
E. Stephenson	Do.	83	773
*W. and G. W. Hindes	Brown Leghorns ...	105	767
Linquenda Poultry Farm	White Leghorns ...	97	748
W. M. Glover	Do.	106	733
Brampton Poultry Farm	Do.	118	717

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Nov.	Total.
HEAVY BREEDS.			
T. Fanning	Black Orpingtons ...	119	1,080
*R. Burns	Do.	124	1,018
*A. E. Walters	Do.	135	998
*T. Hindley	Do.	120	991
W. Becker	Langshans	127	988
Rev. A. McAllister	Black Orpingtons ...	93	975
*Jas. Ferguson	Chinese Langshans ...	98	973
*Parisian Poultry Farm	Black Orpingtons ...	111	956
*C. C. Dennis	Do.	123	943
Jas. Ryan	Rhode Island Reds ...	116	936
G. Muir	Black Orpingtons ...	105	933
*E. Morris	Do.	136	915
Jas. Potter	Do.	84	912
Jas. Every	Langshans	89	906
*E. F. Dennis	Black Orpingtons ...	105	894
*J. Cornwell	Do.	105	879
*N. A. Singer	Do.	124	848
*E. Stephenson	Do.	89	822
*R. Holmes	Do.	97	822
C. Cumming	Do.	119	810
*J. E. Smith	Do.	118	804
*A. Shanks	Do.	121	801
*Mrs. G. Kettle	Do.	96	784
*H. M. Chaille	Do.	95	779
J. W. Newton	Do.	94	772
*E. Oakes	Do.	113	750
F. Harrington	Rhode Island Reds ...	97	706
Tom C. Hart	Black Orpingtons ...	118	650
Total ... ..	...	8,172	60,691

* Indicates that the pen is being single tested.

DETAILS OF SINGLE TEST PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	163	178	191	166	195	161	1,054
W. and G. W. Hindes (W.L.) ..	185	161	173	188	182	155	1,044
Mrs. R. Hodge	165	172	185	171	178	133	1,004
Geo. Trapp	168	153	164	160	174	163	982
H. Fraser	189	140	171	161	165	150	976
T. Fanning	176	152	172	149	153	159	961
H. C. Towers	167	145	165	127	160	186	950
C. M. Pickering	176	160	154	140	179	138	947
W. Becker	176	171	139	141	170	112	909
Chris. Goos	154	172	123	116	133	196	894
J. W. Newton	149	166	174	152	103	140	884
Thos. Fyre	154	145	108	158	163	153	881
R. C. J. Turner	152	139	141	134	155	158	879
Thos. Taylor	144	151	140	121	132	177	865
S. L. Grenier	148	167	116	145	145	138	859
E. A. Smith	174	144	151	139	135	108	851
E. Chester	157	144	131	139	136	140	847
G. Williams	192	152	114	122	134	128	842
Mrs. L. Anderson	145	154	136	131	148	125	839
B. Chester	124	142	161	136	151	124	838
Haden Poultry Farm	92	127	147	147	139	152	804
H. P. Clarke	174	111	137	104	139	118	783
W. and G. W. Hindes (B.L.) ..	117	124	109	116	129	172	767

DETAILS OF SINGLE TEST PENS—*continued*.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	118	151	209	157	182	201	1,018
A. E. Walters	184	175	154	163	153	169	998
T. Hindley	174	173	176	134	164	170	991
J. Ferguson	158	144	145	186	164	176	973
Parisian Poultry Farm	164	154	158	206	116	158	956
C. C. Dennis	157	148	142	174	163	159	943
E. Morris	174	159	107	171	152	152	915
E. F. Dennis	136	163	143	147	141	164	894
J. Cornwell	141	136	147	164	138	153	879
N. A. Singer	147	130	139	142	121	169	848
E. Stephenson	160	132	139	143	107	141	822
R. Holmes	116	140	140	146	167	113	822
J. E. Smith	170	185	128	109	110	102	804
A. Shanks	108	131	131	145	134	152	801
Mrs. G. Kettle	132	153	170	85	112	132	784
H. C. Chaille	100	142	134	161	136	106	779
E. Oakes	108	135	129	157	108	113	750

CUTHBERT POTTS,
Principal.

JUDGE'S REPORT.

In reporting on the judging for "trueness to type," Mr. A. G. Harwood, College Poultry Instructor, writes:—

"It is pleasing to note that a big improvement in type and size of Leghorns has been made. It would appear as if the time had passed when the little squirrel-tailed bird held sway. There is hardly a specimen of this kind to be seen among the 246 competing Leghorns this year.

"On looking back over the past five years, in the course of which our 'true to type' conditions have been in force, and on comparing the type of birds in the current competition with that displayed in previous years, one feels highly gratified with the advance breeders have made, and this with no decrease in egg-production. When it was established that all birds entering for our competitions would be subjected to judgment for 'trueness to type,' we were often confronted with the remark that 'production was required, not feathers.' The steady improvement in type accomplished so far, coupled as it is with an equally high fecundity, would seem to take all sting out of this dictum.

"But there is another feature which is perhaps of even more importance than the retention of an exceedingly high fecundity. In our judgment for type, great stress is laid on stamina. Birds are subjected to egg-laying tests with the object of using them and others of the same breeding for stud purposes. With weak-constituted birds, incubation losses and hatching troubles are great. These can be minimised if stud birds are strong, healthy, and possess great stamina. Had our judgment for type accomplished nothing else but an improvement in this direction, it would have been justified, even had this improvement been accompanied by a slight diminution in egg-production.

"In regard to this, we would again remind breeders of the wisdom of carefully noting any sickness or trouble in each bird in the course of its rearing. However much the birds may appear to have recovered by the time they are selected for competition, it is almost certain that their previous ailments will tell against them in the strenuous effort of rapid egg-production. Again, it has to be remembered that the College competition is conducted under open weather conditions. Birds bred under confined, and frequently under super-refined, conditions have no opportunity to display many weaknesses in constitution and stamina which they may possess. These weaknesses, however, show up under the more open conditions obtaining in the competition.

“The Orpington still gives difficulty in classification, and, as previously, we have had to be lenient in our judgment. What is the most typical pen has proved to contain excellent producers, the six birds laying 882 2-oz. eggs in seven months. These birds possess almost perfect heads according to the Orpington standard. They are blocky and low set (but not to the extreme of the show bird), fairly good tails, and a moderate back. Their colour was excellent on arrival, and their uniformity is most striking. They have a moderate tightness in the feather. The majority of the birds, however, while uniform among themselves, vary much from the Orpington standard. They form a type of their own. This has been pointed out at our last two poultry conferences. Undoubtedly we should adopt a special standard for our laying Orpingtons. As relevant to this point, we quote from a report of the Hague Congress:—

“‘Mr. Bogaert then spoke on the desirability of international standards being issued. He thought that the country of origin should issue the standard and other countries fall into line. He alluded to the Campine, which in English hands has become quite different to the Belgian fowl. He also spoke of the Leghorn, and pleaded for a universal type.

“‘Mr. C. S. Van Gink considered that Mr. Bogaert was too sweeping. Such drastic changes would only be effected gradually, and the matter should be discussed at the next congress. Mr. Van Gink remarked that some countries had apparently misunderstood the schedule of the exhibition, and thought that they could only send birds of their own country. This was not so, as they had hoped that any variety would be sent from any country.

“‘Mr. Edward Brown then spoke on the international standard, and said in his opinion it would be a blunder to insist on such a thing, as the characteristics of a breed were altered by many facts, such as feeding, climate, soil, &c. The countries of Western Europe have paid much attention to breeding, while other countries have not. He exemplified the Leghorn, originated in Italy, and the Minorca in Spain, both of which had been improved by breeders in other countries. Had an international standard been insisted upon, the exhibition would have suffered considerably, as English Houdans could not have been shown, being very different from the French, and the English Brahma differed widely from its oriental stock. He suggested that the subject should be discussed by a committee as of much importance. Mr. Voiteiller agreed with Mr. Brown, and thought an international standard undesirable.

“‘An Italian speaker thought that every country should have a standard for each variety. Unfortunately in Italy they had none, not even for Leghorns, but they hoped it might be remedied shortly.’

“Action has already been taken in this direction in England. Birds sent over from Australia were not recognised as Orpingtons. Instead, they were given the name of ‘Australorps,’ and a club has been formed to foster the breed. Is it not Australia’s duty now to decide upon a standard, adopt the name given by the English breeders, and so save the confusion existing in respect to two distinct and different types? In the current competition at Gatton there are a large number of fine, big, strong blacks of a distinct type. That they have stamina and can produce eggs cannot be denied, but their length of back, length of shank, cut-away front, and long tail in no way compares with the requirements of the Orpington standard. They are absolutely a type of their own. Type makes the breed and colour the variety, and ‘Black Australorps’ should be their name henceforward.”

Details of competing pens are subjoined:—

TRUENESS TO TYPE.

Name.	Class.	Remarks.
S. L. Grenier	1	Good size; typical; good doers.
W. and G. W. Hindes (W.L.)	2	On small side; never still in their pens.
Mrs. L. F. Anderson	1	Uniform and of good type.
Geo. Williams	3	“F” and “D” feathers on shank; variation in outline; splendid doers.
Mrs. R. Hodge	1	The best pen of Leghorns in the test; clean faces, plenty of size, and every bit Leghorns.
J. M. Manson	2	Not too uniform, but hard, tough workers.
W. Becker	1	Just managed this class, their stamina availing them.
Chris. Goos	2	Type variable; “D” and “E” amongst the best birds in the test.
J. W. Newton	2	Headpieces not too uniform; indifferent feeders at times.
T. Taylor	4	“D” very fair; the others too small.

Name.	Class.	Remarks.
Haden Poultry Farm	.. 2	Variable; poor feeders.
H. P. Clarke .. ..	.. 1	An excellent pen throughout.
Thos. Eyre .. ..	.. 1	Could be more uniform; show good stamina.
Harold Fraser .. ..	.. 2	"B" spoils an otherwise first-class pen; she is on the small side, and possesses an upright comb. "A" is very typical.
Geo. Trapp .. ..	.. 1	Very uniform; good length; deep behind.
T. Fanning .. ..	.. 1	Typical; hard, good doers.
R. C. J. Turner .. ..	.. 1	Could do with more width; good length, and uniform.
W. and W. G. Hindes	.. 1	Brown Leghorns as big as any Whites; very uniform and typical.
E. Chester .. ..	.. 2	Inclined to be easy, indifferent feeders at times.
B. Chester .. ..	.. 2	Type variable; excellent doers.
E. A. Smith .. ..	.. 1	Good size; long bodies; a nice pen.
C. Pickering .. ..	.. 1	"D" rather small; a good pen all round.
W. M. Glover .. ..	.. 1	A fine, big, typical pen.
H. Stacey .. ..	.. 2	Poor feeders; uniform; medium size.
O. Goos .. ..	.. 1	One of the best light pens for size and outline.
R. Gill .. ..	.. 2	On small side, possess stamina, and are uniform.
Oakleigh Poultry Farm	.. 2	Variable type; rather narrow; great headpieces; excellent feeders.
E. Stephenson .. ..	.. 2	Variable type; two inclined to be dwarf.
R. Cole .. ..	.. 1	Uniform; hard; good doers.
Mrs. E. White .. ..	.. 2	Narrow; variable tail carriage; nice headpieces.
W. Wilson .. ..	.. 2	Side spikes in evidence; one dwarf.
H. C. Thomas .. ..	.. 2	Type mixed.
Mrs. E. Z. Cutcliffe ..	.. 2	Inclined to be leggy.
J. W. Short .. ..	.. 3	Two very small; size generally uneven.
Linquenda Poultry Farm	.. 2	Very poor feeders; could do with more substance.
F. Birchall .. ..	.. 1	Good all-round pen; very nice headpieces.
Brampton Poultry Farm	.. 2	Variations in type and headpieces.
Bathurst Poultry Farm	.. 1	Even in type and size; a nice pen.
F. M. Newberry .. ..	.. 1	Another even pen; excellent doers.
J. Barron .. ..	.. 1	Excellent bodies and very uniform; amongst the best.
W. Becker .. ..	.. 1	Good heads and legs; uniform.
J. Ryan .. ..	.. 4	Small size; fine bone; no colour or type.
Tom Hart .. ..	.. 2	Side spikes in evidence; the usual class of laying Orpington.
Rev. A. McAllister ..	.. 1	The most typical in the test; uniform; excellent headpieces.
J. Harrington .. ..	.. 1	Plenty of size; good type; colour good on entry.
J. Potter .. ..	.. 2	Side spikes in evidence; taily; rather fine in bone; grand eyes.
G. Cumming .. ..	.. 2	Variable in type.
G. Muir .. ..	.. 1	Not the largest; uniform in type; rather shorter in leg than the majority.
T. Fanning (B.O.) ..	.. 2	Side spikes on one; type variable. This pen contains four birds of the Australorp type.
J. Newton (B.O.) ..	.. 2	On small side; lower than the majority.
Jas. Every .. ..	.. 2	Side spikes on one; rather small; pale eyes in evidence.
T. Hindley .. ..	.. 1	Good eyes; uniform size; good doers; Australorp type.
R. Burns .. ..	.. 2	Variations "A" and "E"; light eyes; "D" and "F" more after the Orpington type; "A" large, resembling laying type.
E. F. Dennis .. ..	.. 2	Good eyes and tails; indifferent heads; Australorp type.
A. E. Walters .. ..	.. 1	Good bright eyes; uniform type; taily; Australorp type.
Geo. Kettle .. ..	.. 3	Feathers on shanks; side spikes; "C" nearest an Orpington.
Parisian Poultry Farm	.. 1	Grand heads and uniform; great workers; the Australorp type.
J. Ferguson .. ..	.. 1	Moderate size; uniform; incessant workers.
R. Holmes .. ..	.. 1	Good heads; Australorp type.

Name.	Class.	Remarks.
A. Shanks	1	Uniform; Australorp type.
J. E. Smith	2	Variations in type; "F" hen Australorp type.
E. Stephenson	2	Good eyes; variable type.
N. A. Singer	1	Plenty of size and bone; Australorp type.
E. Morris	3	"A" and "F" side spikes; variations in type, "A" and "C" as near the Orpington standard as any in the test.
N. Chaille	1	Excellent eyes; blocky and uniform.
E. Oakes	1	Good heads; blocky; lower than usual.
C. C. Dennis	1	Good eyes; uniform; Australorp type.
J. Cornwell	1	The Australorp type again.

THE FOWL TICK.*

By J. BEARD, Poultry Instructor.

Fowls that have been infested by ticks and recover become immune from further attack. This explains the reason why sometimes flocks of fowl are apparently in the best of health and condition, yet, if examined, they will be found to be covered with the larval ticks, and the houses may be found swarming with the pest.

Symptoms.—If clean fowls are put into these yards they will at once become affected and, in three or four days, the result of tick worry and inoculation by the pest, fever will be at its height. The fowls will appear drooping and listless, the combs becoming quite pale; they then lose the use of their legs. Severe diarrhœa sets in, death resulting in a few hours. The better condition the clean birds are in the quicker the poison will act. The fowl ticks themselves are infested with a parasite which they pass into the blood of the fowl, where it becomes a blood parasite, and the micro-organisms multiply with such marvellous rapidity that, in most cases, the fever causes the death of the birds. Every bird, in turn, becomes a centre of infection for healthy ticks that suck its blood, thus becoming in turn infected, and transmitting the blood parasites into a fresh victim. This disease is known as Spirochaetosis in fowls and is caused by a blood parasite. This tiny organism is conveyed from ticks to healthy fowls through the bite of the commonly known poultry tick (*Argas persicus*), its incubation period ranging from three to nine days.

The ticks are capable of transmitting the disease to healthy birds five months after feeding upon the blood of (*Sphirochaeta*) infested fowls.

All poultry, fowls, ducks, geese, and turkeys are subject to the disease, but the losses are always greater amongst the first mentioned. This may be accounted for by the fact that the latter are more restless in their habits, therefore the "seed" ticks have not such opportunities of attaching themselves to these birds.

Remedy and Prevention.—Once the ticks have firmly established themselves in the fowlhouse, it is almost impossible to eradicate them. Therefore the houses and fences should be burnt, likewise any trees that may have been in the pens, and the ground thoroughly disinfected with some strong solution. From experience the following have been found very effective remedies:—Pure kerosene, crude petroleum, creosote, or some of the standard dips, used at a strength of one part of the dip to three parts of water.

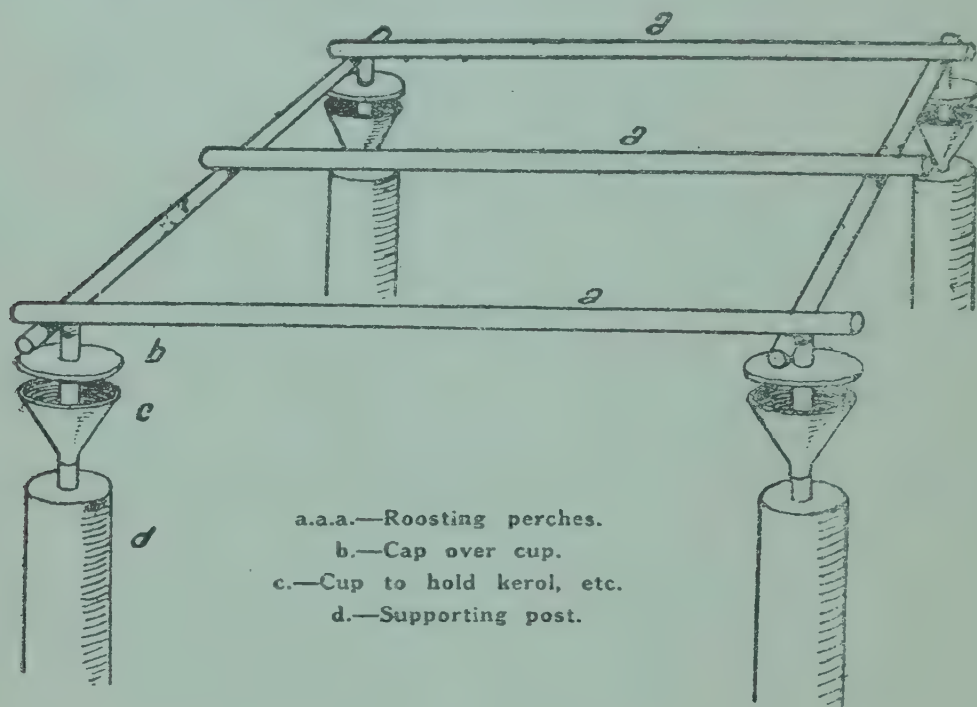
The new houses should be of iron, with as little woodwork as possible. The perches, which should be tick proof, can be procured at almost any ironmongery or poultry supply store. A good plan for a perch is to put two supports of sawn timber into the ground. Drive a nail into each at the top; bore a hole in each end of the perch so that the nail will just go through, and then lay the perch in the supports. This will keep it in position, and the perch can be lifted up to see if any ticks are underneath. Tie a piece of flannel round each support of the perch about half way up and, if there are any ticks about, you will in time catch them all, as after feeding on the fowls they will start for their hiding-place but, being full and lazy, will take the first shelter offering; thus you will find them under the perches or under the flannel. The latter can be removed and be burned along with the ticks that hide in it, and be replaced with fresh clean flannel.

Another method of tick eradication is described and illustrated by "W.R.M." (Sellheim, Q.), who writes in the current "Poultry" (19th November, 1921) as follows:—

"When I first arrived here I found the fowlhouse swarming with ticks, although no fowls had occupied it for four months. I pulled it down and passed all the

* This is a revision of an article that appeared in the "Queensland Agricultural Journal" for August, 1917, *op. cit.*, vol. viii., N.S., pp. 67-99.—Ed.

iron through fires of packing material, then burnt the wood. Then rebuilt and got no fowls for three months, first swinging the perches from the roof, with inverted bottles—full of kerol—on the supporting wires from the roof; this was not stable enough, so I hit on a better plan. Taking some half-inch piping cut into two-foot lengths, I soldered on narrow cups—to hold kerol or sheep dip—about 6 in. from one end. I then sunk blocks of wood into the ground, having bored holes into each block to take a piece of pipe. I used round saplings for perches, with a hole bored in both ends for the purpose of bolting the perches to the supporting pipes. It is nearly two years since I did this, and my fowls have not suffered from a visitation of the tick since."



a.a.a.—Roosting perches.
b.—Cap over cup.
c.—Cup to hold kerol, etc.
d.—Supporting post.

Every care should be exercised to ascertain that all birds coming into the yard are clean and free from diseases and pests. If there is the slightest doubt, the birds should be placed in strict quarantine for nine days and the coops in which they have been kept thoroughly inspected. If young ticks are discovered clinging to the bodies of the fowls, the birds should be dipped in a strong solution of phenol or Cooper's sheep dip, which will kill the pests. After the birds have been dipped in the solution they should be given a teaspoonful of port wine every few hours, and kept in a dry, warm place.

If the fowlhouses are not badly infected the tick can be eradicated by thoroughly spraying with some of the solutions previously mentioned.

On account of its cheapness and the fact that it is so easily prepared, the following is recommended:—Boiling hot soapsuds, to which add $\frac{1}{2}$ oz. crude carbolic to the bucketful. The action of this solution is sure, and if properly applied it will penetrate into the smallest cracks and crevices, which a thicker solution would not reach.

Hot coal tar is also a good thing to use on fences and buildings, but care must be taken that it gets into all the cracks.

If whitewash is used, care must be taken that it is not applied too thick, because as the wash dries a space is left between it and the wood, which makes a good harbour for the pests.

There is yet another method which I have found to be very effective, and that is the use of a blow lamp (such as painters use). The heat and flame from this lamp will penetrate into the smallest cracks and kill all pests that may be concealed therein.

If the poultry-keeper will follow out these simple instructions, his yard should soon become free from the pest, and if it does not remain so he will only have himself to blame for lack of the precautionary measures suggested in regard to the introduction of fresh birds, coops, &c., or non-observance of those warnings contained therein.

CERTIFICATES OF SOUNDNESS.

November list of Stallions registered and certified as sound.

Name of Stallion.	Owner.	Address.
BLOOD STALLION.		
Flirtside	H. F. Hassell	Eumundi

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

TABEBUIA ROSEA.

NATURAL ORDER BIGNONIACEÆ (Trumpet Flower Family).

By E. W. BICK, Curator.

Derivation.—*Tabebuia*, said to be the native name in Brazil (Nicholson, “Dictionary of Gardening,” Vol 4, p. 1); *rosea*, referring to the colour of the flowers.

Description.—*Tabebuia*, a genus embracing about sixty species of glabrous, pubescent or villous, erect trees or shrubs, natives of tropical America. They require similar treatment to that for *tecomas*, under which these plants are sometimes included.

Tabebuia rosea (D.C. Prodr., Vol. IX., p. 215—1855). Leaves made up of five leaflets borne on a fine stem (petiole) leaflets smooth, longish oval, sharpened point, blunt at base, centre one about 6 in., upper pair 5 in., and lower pair 3 in. in length, mid-rib very prominent at back of leaflet, lateral veins alternate, the whole bright green above, and lighter in colour beneath. Flowers numerous, borne in dense clusters at tips of small branches, in similar manner to those of the jacaranda and *tecoma* stans, to both of which it is closely allied. Calyx campanulate, two lipped, about ½ in. in length, corolla tube abbreviated, pale yellow at throat when newly opened, fading to white when older, lobes five, ample, prolonged cover, recurved of a bright rosy pink, stamens four, in two pairs, from ½ to ¾ in., style slightly longer, the whole flower being from 2 to 2½ in. in diameter.

Habitat.—Mexico; also Guatemala. Described as *Tecoma rosea* by Bertol, “Flora Guatemala,” p. 25.

In the Brisbane Botanic Gardens there is a tree, planted in 1903, of from 16 to 18 ft. high, near the kiosk; it is of erect growth, with light-brownish coloured smooth bark. The branches are of too upright a nature to make a good spreading head. The wood appears to be brittle. The tree flowers in November and December. Shortly before this, all the leaves from the top of the tree fall off and the flowers appear on the bare twigs; the dense clusters of rosy pink flowers have a fine appearance, and a large tree in full bloom would have somewhat the appearance of a large-flowered pink jacaranda.

Propagation.—From seed. Unfortunately this tree has not yet borne seed, but as the plants of this order are usually free in producing seed, probably it will, when older, seed freely.

GARDEN NOTES.

By E. W. BICK, Curator Botanic Gardens.

January being one of the hottest months of the year, special attention must be paid to watering. In the evening or at night is the best time. Dahlias and chrysanthemums must be kept well supplied. Thin out a lot of the superfluous growth from the centre of your dahlia plants, if they are inclined to make a lot of growth, and better flowers will result. Keep the flowers cut, and take off all the spent blooms; don't allow them to seed, and the flowering season will be prolonged. These fine flowers should be a feature in every garden for the summer and early autumn months.

Prepare seed beds or boxes for an early sowing of winter annuals, and towards the end of the month plant a small sowing of cineraria, primula, stocks, petunias, dianthus, gerbera, ranunculus, and anemone. These latter two are well worth growing in any garden. The great variety of beautiful colours, and their long stems and fine keeping qualities when cut, make them great favourites. A trouble that occurs at this time of year is that heavy rains often come along when the seed has just been sown, or when the young seedlings are in their first growth, and they are battered down and killed. If provision can be made for cover with hessian or calico that can readily be put on or off, so much the better. Should the first lot be lost, put in another straightaway.

Now is a good time for croton and coleus cuttings. Put nice, strong cuttings of the former in, and your young plants will be good, strong ones for a start. The cuttings do best in about half sand, with a little fine charcoal, cocoanut fibre dust, and a good light loam. Place them around the edges of 5 in. or 6 in. pots, and plunge them in the ground in a well-drained, sheltered position, or in a shaded frame, if available. Although the croton likes plenty of water, it does not like a sour, wet place. A few crotons planted out make a good show and are useful for cutting when flowers are scarce; they revel in a warm, sunny, well-drained position, a free soil, and should be sheltered from strong winds.

If there is any lawn work to be done, get it in hand as soon as possible. Cut out all *Paspalum dilatatum*, *Elusine indica* (Crow's foot), *Sporobolus indicus* ("rat's tail"); fill up holes, and give a light top-dressing all over. Keep it well watered and roll occasionally, and your grass will soon improve.

Any plants of trees, shrubs, or palms planted out of pots will require shading and careful attention in watering for a few weeks, until they get a hold of the soil.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR NOVEMBER, 1921.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Thyra of Myrtleview	Ayrshire	31 July, 1921	1,382	3·8	58·48	
College Mignon	Jersey	7 July	778	5·1	46·42	
Iron Plate	"	12 July	964	4·2	45·82	
Hedges Madge	Holstein	15 Aug.	1,037	3·8	43·89	
Prim	"	9 Mar.	1,168	3·4	43·03	
Gatton Glitter	Guernsey	9 Sept.	785	4·8	42·51	
Miss Security	Ayrshire	20 Aug.	1,138	3·3	41·56	
College Evening Glow	Jersey	10 Oct.	833	4·3	39·99	
Bellona	Ayrshire	26 June	933	3·8	39·38	
Auntie's Lass	"	31 Oct.	925	3·3	33·77	
College Bluebell	Jersey	22 Oct.	607	4·6	31·05	
Miss Betty	"	7 July	648	4·2	30·58	
Buttercup	Shorthorn	28 Oct.	906	2·7	28·62	
Yarraview Snowdrop	Guernsey	14 Oct.	639	4·0	28·60	
Glow VI.	"	28 Aug.	658	3·7	27·17	
College St. Margaret	Jersey	25 Sept.	802	3·0	26·41	
College Cobalt	"	6 Jan.	421	5·1	25·22	
College Cold Iron	"	10 Mar.	494	4·3	24·11	
Miss Fearless	Ayrshire	26 May	512	4·0	22·45	
Dawn of Warragarra	Jersey	15 Oct., 1920	389	4·8	21·52	
College Grandeur	"	29 Dec.	350	5·2	21·59	
Netherton Belle	Ayrshire	30 Nov.	442	4·3	21·21	
Magnet's Leda	Jersey	6 Oct.	357	5·0	20·88	
Hedges Nattie	Holstein	26 Feb., 1921	472	3·9	20·50	
Hedges Dutchmaid	"	26 May	450	4·0	20·11	

SUGAR: FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports (2nd December, 1921) as follows:—

“In the course of the month of November the districts of Bundaberg, Avondale, Miara, Bingera, South Kolan, Bucca, and Gin Gin were visited. Included in the first-named area are the sub-districts of Woongarra, Fairymead, Barolin, and Gooburru.

“*Woongarra*.—On the Woongarra area harvesting operations have finished. The cane has cut satisfactorily for the majority of the growers, who are now busy ratooning and cultivating the young plant crop. Dry weather is slightly checking the cane, but should rain occur before Christmas there is no danger of a serious setback.

“Generally speaking, agricultural operations connected with sugar-cane culture on the Woongarra have reached a higher standard than has been the case for some time. This is due to the fact that after the drought period that followed 1918, and the consequent deterioration of the crops, the farmers realised the necessity for thoroughly cleaning up their ground for the 1920 planting. This meant that the great bulk of the area was ploughed and cleared of old stools, and fresh cane planted, more care being taken in plant selection than is usually the case. There is yet, however, need for more crop rotation and vegetable manuring in these volcanic soils if canegrowing is to be successfully maintained until irrigation is accomplished. On some Woongarra farms cane has been grown continuously for forty years without a break or crop rotation of any kind, and therefore it is not surprising that these farmers get poor tonnages, even in wet seasons.

“Q.813 is doing well, the young plant cane of this variety looking very vigorous and promising a heavy tonnage for next year.

“Shahjahanpur is also making a good showing, Fairymead having planted about 40 acres at Spring Hill plantation. It is not altogether advisable, as yet, to plant too much of this variety until it shows a tendency to thicken, and the trash to become less adhesive. This may come about by careful farming and the cane adapting itself climatically.

“Other varieties making a good showing are 1900 Seedling and Badila, the latter principally on Qunaba plantation. D.1135 is still considerably grown, but the necessity for changing this cane has arisen, and growers would be well advised to try such varieties as Q.813, Q.855, Q.285, Q.907, or M.1900 Seedling, wherever possible, in its stead. D.1135 is showing ‘striped leaf’ and ‘gumming’ in a widely distributed manner.

“In the Woongarra district certain standard chemical fertilisers are in use, but most of the farmers are doubtful whether they are obtaining positive results. The best plan for the growers to adopt with regard to the use of fertilisers is to go to the Sugar Experiment Station and study experiments that have been carried out on typical soils and take advantage of analyses performed.

“*Barolin*.—On the Barolin side the cane is a little better, if anything, than on the Woongarra area. This is probably due to the fact that the farms here have been favoured with scattered thunderstorms. The variety M.1900 Seedling is making a particularly good showing, especially down towards the Elliot Heads, where this cane is principally grown. Other varieties are making average growth, while the c.c.s. values obtained were uniformly good. The grub pest is in evidence in the Barolin areas, and farmers who are in the track of prevailing winds should, as a preventive measure, endeavour to remove as many of the feed trees as possible. Carbon bisulphide as a repellant would probably be useful. There is not, however, a sufficiently heavy infestation to cause alarm.

“The majority of farms are in good condition, the farmers recognising the value of a good tilth as a moisture-conserving measure.

“It is worth noting that while some farmers pay particular attention to their cane, they allow badly kept patches of sorghum and cowcane to abound near their fields. These grains, in many instances, serve as hosts for parasites, either insect or bacterial, and should be kept away from sugar-cane.

“As mentioned several times in previous reports, the use of lime and green manures is recommended. Lime would probably increase the potash value of the soil, and green manures would give it badly wanted humus.

“The cane variety showing the greatest hardihood in the district is Yuban. It is a greedy feeder, with an immense top, but really should be discarded for reasons set out in previous reports.

"Black Innis is showing promise at Gooburrum, and there are also some good strikes of D.1135. There is less disease showing here than at other places visited round Bundaberg, and insect parasites are negligible this year.

"The question of chemical fertilisation should be closely gone into here, and small plots established to try manures under local conditions.

"I was afforded every facility for looking over Fairymead plantation. Fertilisation is being carried out on a liberal scale this year, and, generally speaking, the cultivation is good. The management has planted a big acreage of Black Innis, and has, as well, considerable areas of D.1135, Yuban, Q.813, Shahjahanpur, and a number of other varieties well known in the Bundaberg district.

"*Avondale*.—Canegrowing at Avondale is making favourable headway, the growers interesting themselves considerably in modern agricultural methods. At Avondale plantation, the Manager (Mr. Leaper) is doing good work. A block of plant Q.813 and D.1135 Sport is the best plant crop I have seen for some time. It would be a valuable assistance to the farming community if any growers with quantities of the former variety would allow farmers to purchase a portion for plants next year, if possible. Owing to careful selection of plants, disease at Avondale has dropped to a minimum. This especially applies to 'striped leaf' disease. The usual borer infestation appears to be minimised this year. Small losses are occurring through the depredations of the indigenous cane rat.

"*Miara*.—Down the river at Miara the farmers are busy cultivating and planting. Their crop returns this year have been good, both in tonnage and density. B.208 gave the best returns, although this variety is showing in places secondary symptoms of 'striped leaf' disease. There is great need, therefore, to be careful in planting this cane.

"Other profitable varieties are N.G.40, D.156, D.1135, H.Q.426, and Green Goru. Of these canes, N.G.40 gave the highest average c.c.s. values.

"Green manures would greatly benefit the farms back from the river, as they are deficient in humus. Miara is a good canegrowing area, although small, and energetic farmers should do well. Transport is the principal drawback.

"*Bingera*.—Bingera and South Kolan districts have sent more than their average amount of cane to the mill this year. Bingera plantation had a big crop, and the management expects to be crushing until some time in January. High densities are being obtained, especially from the 1900 Seedling, which in some cases is going over 17 per cent. of c.c.s. Other canes doing well are D.156, B.156, Q.813, N.G.16, and D.1135. Good strikes are effected by soaking the plants in a solution of lime. The cane and ratoons look promising, chemical fertilisers having been used in many instances. These are mainly of the standard type, calculated to supply nitrogen, potash, and phosphoric acid in a concentrated form. The management attributes its success this year to deep and thorough cultivation, familiarity with the local soil conditions as a basis for chemical fertilisation, keeping the soil from becoming deficient in humus, careful selection of plants and changing, careful survey of cane, destruction of diseased plants, and irrigation.

"At South Kolan the farmers have some very fine crops of young plant cane and ratoons. They are keeping the land free of noxious weeds, and there is little evidence of insect parasites. The cane giving the best returns, however—1900 Seedling—is not ratooning as well as it might, owing to the presence of a disease in the stools. Other cane varieties which look well are Cheribon, Brisbane Seedling, D.1135, and N.G.16.

"*Bucca*.—At Bucca the farmers' prospects look better than has been the case for years. The roads have improved, although they are still pretty bad, and the organisation of the industry as far as transport to the mill is concerned has much improved. The farmers are still cutting, and the ratoon cane is coming along nicely, especially the young plant crop. The fields are well cultivated and free from weeds, and although a slight borer infestation appears at intervals, natural enemies are a controlling factor. An occasional grower is having some difficulty with his cane, in cultivating, owing to the rocky nature of the ground.

"Cane varieties recently obtained from the Sugar Experiment Station are Q.813, Shahjahanpur, E.K.1, and Q.1098. Of these, the two lastnamed are making a good showing. Q.813 is backward, but strong. Shahjahanpur is stooling heavily, as usual, but thin.

"*Gin Gin*.—At Gin Gin the canegrowers want rain. The ground is getting dry, although it still contains enough moisture to sustain the cane for some time yet. The farmers have had a good crushing this year, the cane being of good sugar content and cut with a minimum of industrial friction. The cane is ratooning well, and the

young plant crop is looking vigorous. Most of the growers are hard at work, and well-kept holdings are to be seen everywhere. Very little disease is showing, and the farmers have what might be termed a 'flying start' for next season.

"A visit was paid to that productive and well-situated belt of farm land on the river above Wallaville mill. This area should be ideal for irrigation if the farmers concerned could combine and make it an accomplished fact.

"*Maroondan*.—Farmers are still cutting. They have had heavy crops and high densities this year, and the cane is again growing strongly, although slightly affected by dry weather.

"Messrs. Sondergeld Bros. have an outstanding crop of plant cane (M. 1900), the result being achieved by constant and thorough cultivation and green manuring.

"There is no doubt about the tremendous improvement in texture given to these soils by green manures. Farmers' tonnages would be heightened if they could carry this out on a more extensive scale.

"Regarding varieties at Maroondan, the best plant crops appear to be 1900 Seedling, Q. 813, and D. 1135.

"I would advise the growers to increase their acreages of Q. 813.

"Summarising, the following principles could be more closely applied by numbers of growers in the different districts:—

- More careful selection of plants;
- Changing from dark soils to red soils, and *vice versa*;
- Thorough cultivation, especially in dry weather;
- Deep ploughing;
- Green manuring;
- Liming;
- Careful consideration and experiment before applying chemical fertilisers;
- Destruction of old stool suspected of containing disease; and
- Use of animal manure wherever possible."

The Northern Field Assistant, Mr. E. H. Osborn, reports (13th December, 1921) as follows:—

"*Mossman District*.—Early in November this area was visited. The mill had just finished a most successful crushing season, covering a period of seventeen weeks and accounting for a total of 62,165 tons of cane. The run was a very good one from every point of view, the cane being cut at very reasonable rates, and the constant supply of same was easily a record for the mill. Extraction was also good, and, in fact, everything worked in a very satisfactory manner, especially as no labour troubles of any kind, either in mill or field, caused friction or delay. Existing relations between the employers and employees in the district seem excellent.

"The approximate average density of the principal canes are as follows:—

Badila	13.61 c.c.s.
24 B (Green Goru)	13.04 c.c.s.
H.Q. 426	13.56 c.c.s.
D. 1135	12.64 c.c.s.
B. 147	12.51 c.c.s.

"The acreage cut was 3,804, giving an average per acre of 16.3 tons.

"For 1922 same 4,380 acres will be under crop, or an increase of 576 acres, and, as the cane has mostly got away well and is getting plenty of work put into it plus a fair quantity of manure, the tonnage figures for 1922 should show a decided increase on this year's output.

"Rat-poisoning with arsenic was also being carried out intensively by the company's officials, and, in connection with this, Mr. Muntz (Chairman of Directors of the mill) tells me that far better results are obtained with this poison than with strychnine. In a number of places I noticed that greyback beetles were coming out very freely, and in Cassowary and Saltwater some small plots of plant cane were said to be suffering from the effects of wire worms. Unfortunately, I could not obtain specimens of the latter, but, from observations elsewhere, the one said to be doing the damage at Mossman is somewhat different. In most places the young cane looks well, and ratoons are also coming away vigorously.

"On Mr. Crees's farm varieties were cut as a plant crop of 16-months-old, and, whilst the Badila and Hybrid No. 1 only gave a c.e.s. of slightly over 11 per cent., the Q. 903 was just 15 c.e.s.

"Manuring was being carried out generally as a regular thing, and I am informed by the mill authorities that the quantity of manure ordered this year is in excess of any other previous order. The following figures are of interest as showing the quantity and nature of the manures being used:—

Meatworks	..	..	..	..	350 tons
Sulphate of ammonia	..	..	..	..	200 tons
Basic super	..	..	..	..	150 tons
Shirley's 3.7	..	..	..	..	130 tons
					<hr/>
					830 tons

"As mentioned in my previous report, the need of lime seems to be very apparent.

"At Mr. J. Robins's limestone show at the 7-Mile, the outcrop seems very large, runs roughly north and south, and is said to be of excellent quality, analysing from 95 to 98 per cent. of lime. It is situated upon a fairly steep ridge overlooking the Mossman Mill permanent line, and within about half a mile of the rails.

"*Freshwater.*—The conditions were seen to be very healthy, and all the cane has made splendid growth. Some very heavy work has been done in this locality since February last. On the Caravonica Estate 292 acres of land have been grubbed of lantana, burnt off, ploughed, and planted. Some plant cane upon this holding cut 45 tons to the acre, first ratoons 32 tons, and second ratoons 25 tons, quite recently, the cutters on the plant cane averaging 8 tons per man per day.

"Near Redlynch station some fine cane is also to be seen. It is mostly very clean, and looks remarkably well. At the time of my visit Mr. Surveyor Rutherford was engaged by the Colonial Sugar Refining Company in laying out horse-tram lines and permanent engine lines to harvest next year's crop from this locality. The scheme is a big one, and comprises about 2 miles of permanent engine line from the present terminus of the Colonial Sugar Refining Company's line to Edge Hill, whilst some $3\frac{1}{2}$ miles of horse tram line and a bridge are to be built over the Barron from Redlynch station roughly in the direction of Caravonica. A further mile of the same sort of line is to go from Redlynch to adjacent country, whilst yet another mile of similar material goes from Jungara railway station to serve nearby plantations. All this cane coming over the horse tram line to Redlynch will be derricked and loaded at Redlynch for transportation per the Government railway to Hambledon. The cane cut on properties adjacent to the permanent engine line at Edge Hill, will, of course, go direct to the mill. The completion of these lines means a very busy time for the Freshwater district in the near future.

"*Cairns.*—Some very good cane was observed. At Mr. H. C. Draper's Farm, Waree, the plant and also the recently-cut cane look very well. Mr. Draper uses green manure and limes, also subsoils, and the results of his lately-cut crops certainly prove his wisdom in doing so. He also uses mixed manures with the following results:—Plant cane, 45 tons to the acre—First ratoons, 32 tons; second ratoons, 30 tons; and some third ratoons are now cutting about 25 tons per acre. These figures speak for themselves."

THE COTTON INDUSTRY IN QUEENSLAND.

BY MAJOR A. J. BOYD.

Although cotton has been grown for many years in this State, and, during the Civil War in America, to great advantage both to growers and purchasers of the crops, there are still people who make it their business to try to impress agriculturists with the idea that they themselves, although they have never been engaged in agriculture in any form beyond the cultivation of maize and potatoes, hold as to the profits to be derived from the land devoted to some semi-tropical crop, and they emphasise the statement that it is impossible to make money out of cotton owing to the want of cheap coloured labour. This statement is made in face of the fact that since the introduction of cotton-ginning machinery by the Queensland Department of Agriculture, and the gratuitous distribution by that Department of cotton seed, the farmers who have planted it year after year have made good profits by their enterprise. Each succeeding year the number of growers has increased, and it is no exaggeration to say that many have succeeded in making more money per acre out of cotton than by any other crop, not excluding sugar-cane.

Lately, a gentleman (Mr. Crawford Vaughan, ex-Premier of South Australia) representing a British company formed for the purpose of encouraging the growing of cotton in some suitable country within the British Empire, has visited, among other territories, Queensland, for the second time this year. In a report presented to the State Premier, Hon. E. G. Theodore, on the progress of the movement, he stated that, having previously visited many tropical and semi-tropical countries where cotton is grown, he had come to the conclusion that Queensland to-day presents the best conditions for the industry.

"The British Government had," he said, "set aside a sum of £1,000,000 for the encouragement of cotton-growing within the Empire, a portion of which would be devoted to establishing the industry in Queensland." This fact alone warranted his company in deciding, after studying the climate, localities, soils, and means of transport from farms and plantations to a shipping port, that the cotton industry could be firmly implanted here on a very satisfactory basis. Matters had now progressed so far as the importation by his company of three up-to-date cotton-growing plants, which, presumably, include cotton gins, linter machines, baling presses, and other appliances. These will arrive here in time to deal with the next cotton crop, which is expected to be a comparatively heavy one, and will be set to work in three different districts where the most cotton is at present grown.

There is a large area under cotton this season in the State, and, notwithstanding a spell of dry weather in one or two districts, the crop, generally, promises to be a large one, and it is probable that more gins will shortly be installed.

Mr. Vaughan, on his first visit to Queensland about ten months ago, secured samples of Queensland cotton from several localities in the south, north, and west, some of which was grown on the coast, and others on the tableland and western plain country. On his return to England he submitted them for the opinion of cotton brokers, who unanimously commented most favourably on the samples as possessing all the best qualities of the more valuable cottons of other countries (probably including America, Egypt, Africa, and India) in respect of length and strength of fibre, colour, and other desirable attributes.

It has long been known that the western districts of Queensland, particularly the Warrego, Maranoa, Condamine, and other districts, including the Darling Downs, produce a very fine class of cotton, mainly Uplands (short staple). Very little Sea Island cotton has been grown, although this long-staple variety is of greater value than the Uplands, which are all short-staple, except some crossbred varieties, which carry a longer fibre, whilst the Sea Island is prized by cotton buyers for its length and silkiness of the fibre. The latter class prefer the saline atmosphere of the coast to the drier western plains, but it is probable that much of this variety will be sown next year, both on the coast and inland, when suitable seed is available.

On the first introduction of cotton-growing in Queensland (about the year 1858) the Sea Island variety was grown in the Logan district, but conditions there appear not to have been favourable for its cultivation in those early days. Furthermore, the only gins brought out by intending growers were small, hand-driven machines which were unable to turn out more than a few pounds of lint per day. The present-day saw-gins will turn out up to 2 tons a day, while the linting machines will remove all fluffy cotton adhering to the seed of Upland cotton after the latter has passed through the saw-gin. A large quantity of cotton which was formerly thrown away with the seed is now saved by means of the "linterer." Roller gins are used for long-staple cotton. It is singular that, although experiments without number have been made by planters and others in the hybridising and crossing with the best varieties of Sea Island, Egyptian, and other cottons, few of the new kinds have been obtainable, even from America or from other centres of the cotton-growing industry, the only ones in Queensland being Russell's Big Boll, Jones's Improved, and one or two others.

One thing—and this is a most important point in favour of Queensland as a cotton-producer—is that the plant is practically free from diseases which are ravaging the cotton districts of the United States and Egypt to such an extent that the States, it is feared, will not be able to produce a 14,000,000 bale crop, and supply their own cotton factories as well as producing an exportable surplus.

There is nothing new to say about cotton-picking machines. A reference to past numbers of the "Queensland Agricultural Journal" will suffice to show that the successful mechanical cotton-picker has not yet made its appearance in any part of the world. A machine which gave promise of great success was, some years ago, invented by Mr. Daniel Jones, one of the pioneer cotton-growers of West Moreton, and to whose enthusiasm and practical knowledge the present encouraging condition of the industry is largely due. This machine eventually was not so successful as was anticipated. Since then, others have appeared on the scene, only to suffer a like

fate. The latest one made the nearest approach to success. It worked by pneumatic suction. As the machine passed through the cotton rows, the bolls, or rather the cotton hanging from the burst bolls, was sucked from the open boll and passed in to a receiver. It had, unfortunately, one defect, which sent it to the limbo of former failures. The fault was that the powerful suction took in both ripe and unripe cotton. I have heard of no later invention.

But, considering all things, with a complete knowledge of the history of cotton-growing in Queensland and of the areas within our borders naturally adapted for its successful propagation, I have no doubt that the present revival in the cotton industry will end in cotton becoming a great wealth-winner, and one of our staple products.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 25.

A WESTERN BURR (*Sida platycalyx*).

For some years past we have from time to time received samples of a large, flat, somewhat disc-like burr taken from wool received from Western Queensland. Beyond placing the burr as the seed-vessel (carcerulus) of some plant of the Mallow family, further determination was found impossible. Now, however, we have received from the Australian Estates and Mortgage Company, Limited, several specimens of the plant bearing the burr, gathered by Mr. P. Tully on Ray Station in the Adavale district. The plant proves to be *Sida platycalyx*. The genus *Sida* is one containing several very common weeds, such as the *Sida retusa*, *Sida acuta*, Flannel Weed (*Sida cordifolia*), &c.

Description.—A small woody plant, densely clothed in all parts with a woolly floccose, stellate tomentum. Leaves broadly ovate or orbicular, slightly cordate, crenate, 1-1½ in. long, on a petiole (leaf-stalk) of ¾ to 1 in. long. Flowers on pedicels (flower-stalks) as long as the leaves, the pedicels articulate above the middle. Calyx broadly campanulate about ½ in. across, each lobe marked with three longitudinal ribs, with an intermediate rib on the tube below the junction. Lobes broadly triangular. Petals bright yellow, 6 to 7 lines long. Stamens numerous, staminal column short, carpels about 24, closely packed in a tomentose ring round the base of the styles, which are free almost to the base, with small capitate stigmas. Fruiting calyx enlarged, completely enclosing the ripe carpels (burr), marked with numerous longitudinal veins. Carpels echinate, with rather long hirsute spines, indehiscent and adherent to one another, forming a ring or disk-like burr nearly 1 in. in diameter and ½ in. in depth. Seeds greyish-brown, 1½ lines long, oval or somewhat kidney-shaped.

Distribution.—North Australia, Central Australia, New South Wales (?), and Western Queensland.

Botanical Name.—*Sida*, believed to have been the Greek name of some plant of the Mallow family; *inclusa*, Latin, meaning confined, referring to the burr being enclosed in the enlarged calyx.

Germination.—The method of germination is worthy of note; the carpels, unlike most species of *Sida*, *Malva*, *Abutilon*, &c., are indehiscent; that is, they do not split open and shed the seeds. Instead, the whole burr becomes buried in the soil and several seeds germinate. The burr remaining in the ground round the plants can be seen as in the accompanying illustration.

Botanical Notes.—*Sida platycalyx*, F. v. Muell. Herb., Benth. "Fl. Austr.," I., 197; Bail. "Queensl. Flora," I., 115; F. v. Muell., "Vic. Naturalist," V., 138. *Sida inclusa*, Benth. "Fl. Austr.," 197; Bail. "Queensl. Flora.," I., 115, F. v. Muell. "Fragm. Phytogr. Austr.," IX., 131, and XI., 32.

Sida platycalyx was described from flowering and *Sida inclusa* from fruiting specimens. They were originally described on the same page in the "Flora Australiensis," and from the complete specimens now to hand I have no hesitation in uniting the two. *Sida platycalyx* has been recorded by Mueller l.c. from the Bulloo River, South-Western Queensland. He also records it for New South Wales in his Second Census, but Maiden and Betcher in their recent "Census of New South Wales Plants" do not recognise it as a New South Wales species. It is most likely that it does occur in the North-Western parts of that State, though several records are made by Mueller in his "Second Census" that cannot be backed up by authentic material in any of the larger Australian Herbaria.

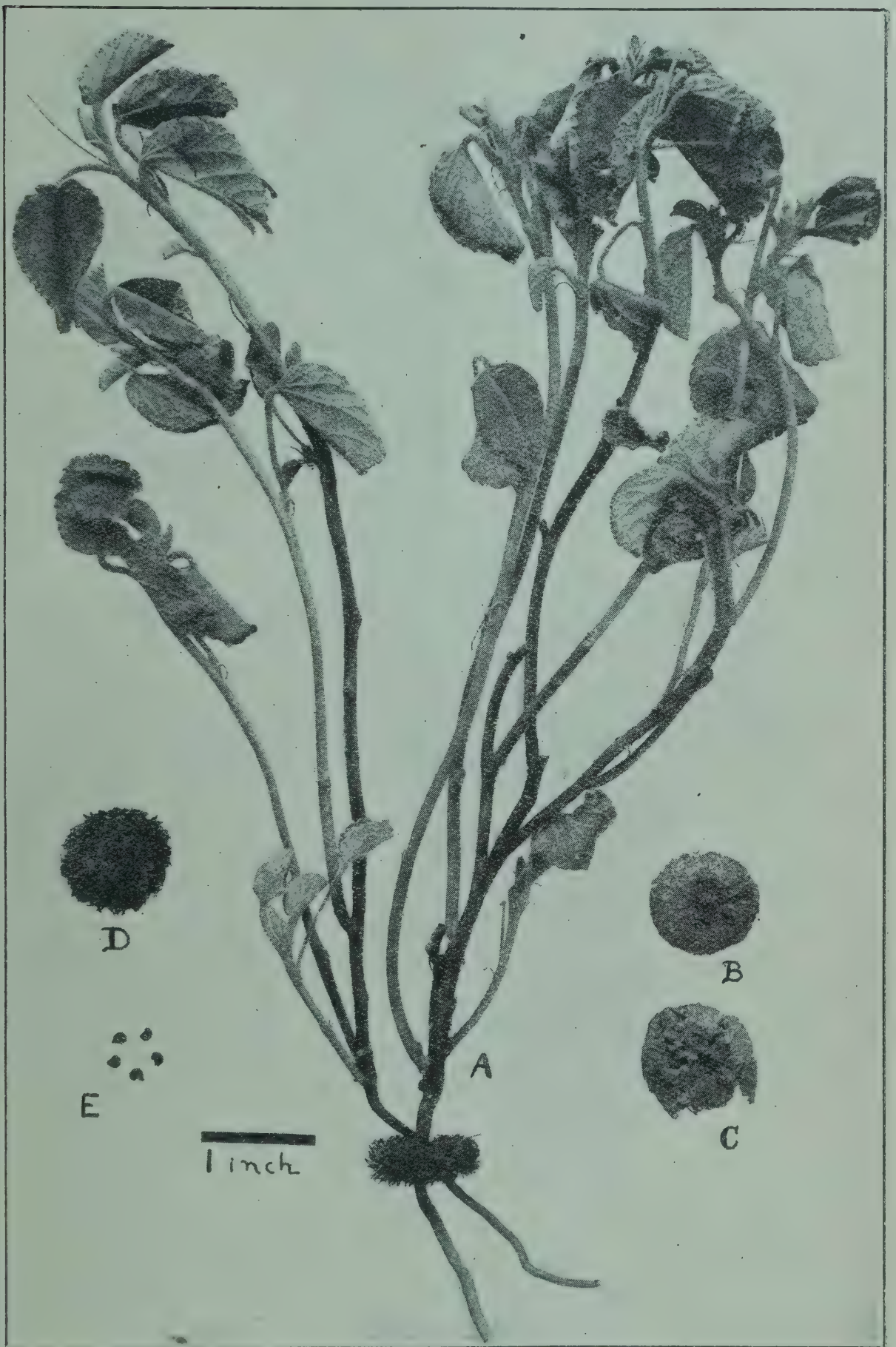


PLATE 15.—A WESTERN BURR (*Sida platycalyx*).

- A.—Two plants growing from an old Burr.
B.—Burr enclosed in the enlarged calyx (viewed from below).
C.—The same (viewed from above.)
D.—Older Burr freed from the calyx.
E.—Seeds.

TWO VINES REPUTED POISONOUS TO STOCK.

Recently the Stock Inspector at Beaudesert (Mr. J. H. McCarthy) forwarded to the Department two specimens of vines which he suspected as causing losses among stock in his district.

In one case the loss of five head of calves was reported on a property at Tambourine Mountain, and it was noticed that the calves had eaten freely of a particular vine known locally as "Milk Vine." On examination by Mr. C. T. White, F.L.S., Government Botanist, this proved to be *Marsdenia rostrata*, a plant of the family *Asclepiadaceae* and a close ally of the *Hoya*, which is well known as a vine poisonous to stock. The family *Asclepiadaceae* is one that contains several poisonous plants, both in Australia and abroad, so it is quite likely that the *Marsdenia* was in this case the cause of the trouble. It is a soft vine with rather light-green leaves, and bears tufts of white *Hoya*-like flowers in the leaf axils. Every part of the plant, when broken, exudes a milky sap.

In the other case several losses were reported from Kerry, and the animals were noticed eating a small vine growing in the forest country. This plant proved to be *Secamone elliptica*, of the same family as the *Marsdenia*. It is a slender vine with narrow leaves and small greenish flowers. When cut or broken, it exudes a milky juice. Both plants bear green pods (follicles) which, when ripe, burst open longitudinally, allowing the seeds to escape. The seeds are numerous in the pod, and each is provided at one end with a tuft of long white, silky hairs.

CANE-BEETLE CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (20th December, 1921) from the Entomologist, Mr. E. Jarvis:—

"EMERGENCE OF CANE-BEETLES.

"As a result of showery weather between the dates 26th and 31st October, which gave a precipitation of 1.40 in., 'grey-back' beetles emerged rather freely from volcanic and other soils around Gordonvale, in which pupation had taken place within reach of the plough. Pupæ located in such situations probably feel the effect of solar warmth earlier than those lying at greater depths or in heavy clay-loam lands. At Highleigh the first appearance of the pest attracted some attention, the beetles being very numerous on various food plants bordering the main road, and congregating in thousands on some large fig-trees (*Ficus benjamini*) close to the residence of Mr. J. Cannon. The native food plants found to be mostly affected in this district on 11th November were the Moreton Bay Ash (*Eucalyptus tessularis*) and one of the rough-leaved figs (*Ficus opposita*), the latter species, however, being, as a rule, seldom eaten unless far removed from other more favoured feeding trees.

"Twenty-nine beetles were collected from one of many small bushes of eucalyptus about 5 ft. high, growing on a roadway in the midst of cane land, fifteen of these being male and fourteen female specimens.

"Again, forty-eight beetles collected earlier, at random, from gums around the laboratory close to canefields, between the dates 4th to 7th November, and placed separately in cages for experimental purposes, were found, when examined after death, to consist of thirteen males and thirty-five females.

"The above figures substantiate data already published by the writer in 1915 ('Australian Sugar Journal,' Vol. VI., p. 891), and show the importance of collecting beetles from feeding trees close to headlands during the three weeks following emergence, before egg-laying commences.

"On the 18th November we had an additional fall of 1.36 in. of rain, and three days later a second lot of 'grey-backs' found their way to the surface. On one plantation of first ratoons at Meringa, for instance, as many as five beetles emerged from beneath each stool of cane, which means that the beetles arising from every acre of this land are sufficient to produce, later on, enough grubs to destroy fully 9 acres of cane.

"LIGHT TRAPS.

"Some rather interesting observations were made during several evenings between the 4th to 26th November regarding the tropic reaction of *albohirtum* to artificial light. The trap employed was a simplification of that designed and figured by the writer in 1916 ('Australian Sugar Journal,' Vol. VII., p. 903); and in the present instance consisted of an empty kerosene case fitted with side platforms and vertical barriers of galvanised iron, the latter being glazed where coming opposite the burner of an acetylene lamp of 21 litres capacity.

“Early in the month few beetles were caught, as the moon happened to be nearing the end of its second quarter, and, moreover, temperatures between the hours of 8 to 9 p.m., while beetles were on the wing, were rather low. During these few nights it was noticed that grey-backs, when approaching the trap, were inclined to circle around it, influenced possibly by the moonlight, and that, if failing after several short flights to reach their objective, ceased to be attracted, and suddenly became motionless. When this stage had been reached a bright flame placed 2 in. from the head of the beetle did not affect it in the least, clearly indicating a cessation of positive phototropic reaction for the time being. On the 26th November, from 8 to 9 p.m., four specimens of the so-called Christmas Beetle (*Anoplognathus boisduvali*) entered the trap, and only fourteen grey-backs, the temperature having dropped in the course of an hour from 82 to 72 degrees Fahr.

“Beetles belonging to the second emergence will commence invasion of the canefields about the 10th December, when it is hoped to secure further data regarding the influence exercised at that time by artificial light on male specimens and egg-laden females.

“ATTRACTIVE AROMAS FOR CONTROLLING CANE BEETLES.

“This line of work has consisted in the preparation and exposure in the field and feeding trees during night time of various odours, one of which, it is hoped, may be found attractive to the adult beetles.

“The principal substances experimented with have been (1) those considered likely to prove palatable as food; (2) chemicals possessing aromas resembling those emanating from the chief food plants of the beetle; and (3) miscellaneous odours such as arise from decaying vegetation, soils, roots, &c.

“This experimentation is of decided importance, as in the event of any success being obtained, it would then be a simple matter to design suitable traps, which, when baited with the attractive substance, could be so arranged in a canefield as to lure to destruction from different directions most of the invading beetles.

“It may be of interest to state that my hopes regarding this form of control were stimulated after making a microscopical examination of the antennæ of *albohirtum*, our common grey-back cane beetle. The sense of smell in insects is known to reside principally in these organs, and in the case of the beetle under consideration the laminæ, or plates composing the antennal club, are very highly specialised, the surface of each of the four plates in that of the female being closely covered with many thousands of minute pits or pori, each containing a central rod connected with the olfactory nerve. I found these pits to occur in even greater numbers in the club of the male, which is provided with an additional plate for their accommodation.

“Doubtless it is this keenness of scent which enables our cane beetle to locate from a distance certain favourite feeding trees.

“This line of research is well worth investigation; and should any grower chance to notice grey-back beetles assembling in numbers on or around objects other than feeding trees, in such manner as to suggest their having been attracted, it would be advisable to communicate at once with the entomologist, either by wire or 'phone (Tel. 95 Gordonvale). The accompanying photograph illustrates experimentation with aromas exposed in traps hung among the branches of *Ficus pilosa*, and grey-back beetles eating the leaves of this favourite food-plant. The insect (one-third full size) shows characteristic injury.

“EGGS OF BEETLE KILLED BY FUMIGATION.

“On 19th November, eggs of the grey-back beetle were obtained from caged females in our insectary, and three days later placed in flower pots of moist soil and fumigated with carbon bisulphide.

“Two eggs were put in the bottom of each pot in a small cell roofed by a compacted piece of earth, and covered with from 130 to 280 cub. in. of soil. The bisulphide was then administered at distances varying from 4½ to 8 in., the dose in each case being two drachms (½ oz.). In field practice, if a couple of injections were given to each stool of cane, the above dose works out at about one drum per acre.

“Twenty-four hours after treatment the eggs were taken from each pot and placed in glass cells, in order that developments might be closely observed. Little change was apparent for two days, except that the treated eggs darkened slightly and did not increase in size; but on the 25th November (three days after fumigation) the control eggs had become noticeably larger and remained creamy-white, while the treated specimens were dark-brown and partially covered by mould.

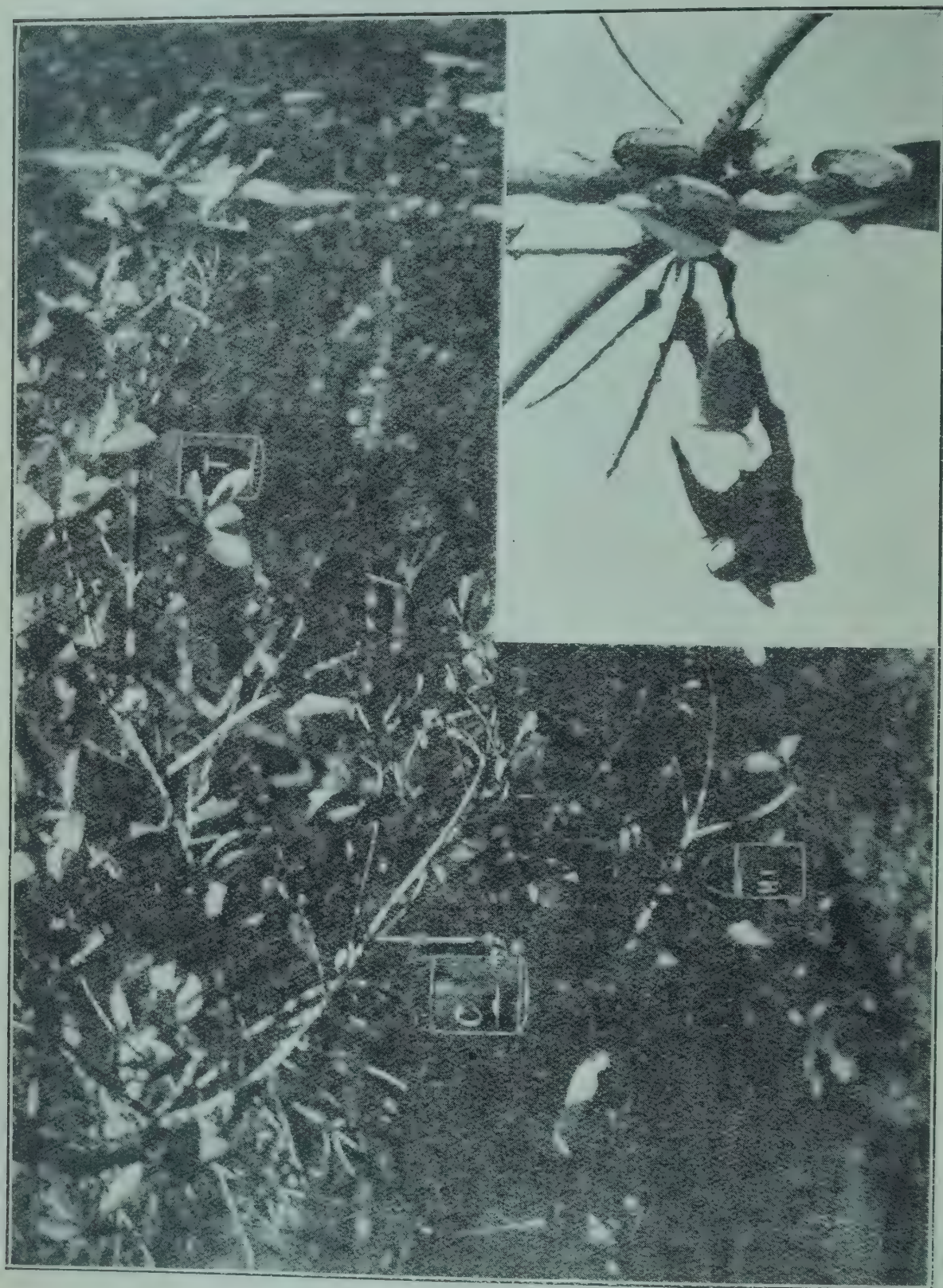


Photo. by E. Jarvis.]

PLATE 16.—EXPERIMENTATION WITH AROMAS AGAINST THE “GREY-BACK” CANE-BEETLE. Note bait-trap hung among branches of feeding-tree (*Ficus pilosa*). INSET.—Cane-beetles devouring foliage of same ($\frac{1}{3}$ full size.)

“By 1st December all that remained of the latter was the shrivelled egg-shells (chorion), each in the midst of a patch of mould on the soil; while the untreated eggs—submitted to exactly the same conditions of moisture and temperature—were perfectly normal, free from any sign of mould, and had developed to nearly a quarter of an inch in diameter. This experiment was repeated on 24th November, with varying doses of bisulphide, the same results being obtained in every case. We may safely conclude from the above details that such fumigation kills the eggs in a few hours, although, naturally, mould does not appear on the chorion until the internal albuminous matter commences to decompose.

“This discovery is not without value, since the knowledge gained enables us to start fumigation, if desired, as soon as the eggs are deposited, thus allowing more time in which to get over a big plantation while the cane is still small.

“TRAP-TREES FOR KILLING BEETLES.

“Continuing research work in this connection, initiated by the writer in 1915 (*‘Australian Sugar Journal,’* Vol. VII., p. 62), five sets of experiments have been conducted between the dates 5th November to 2nd December, comprising eighty-nine cages containing leaves sprayed with various arsenical solutions. The data secured will be published next month.

“PARASITE OF MOTH-BORER.

“Three years ago (November, 1919) the writer was fortunate in breeding a *Braconid* wasp (*Apanteles nonagriæ* Oll.) from our large moth-borer of cane (*Phragmatiphilia truncata* Walk.).

“This parasite, which was first recorded by Oliff in 1893, is thought to be of great value in New South Wales, where it helps to control the ravages of the same moth-borer.

“It had not, however, been previously recorded from Queensland, so that its presence at Pyramid in 1919 is of considerable economic interest. As mentioned in my October report, we were hoping to obtain specimens of this useful parasite again, in order to breed numbers for distribution in the Lower Burdekin, or other districts where it is proving troublesome. I am glad to state that our search has been successful, and a number of specimens have quite recently been bred from ratoons collected at Banna, near Gordonvale.

“The subsequent rearing of these tiny wasps at the laboratory will be very interesting, as the technique and methods of handling such insects differ in many respects from those adopted when breeding tachinid fly parasites of the beetle-borer.”

THE BANANA BEETLE BORER.

(*COSMOPOLITES SORDIDA* Chev.)

(*Curculionidæ*.)

[SECOND PROGRESS REPORT.]*

By JOHN L. FROGGATT, B.Sc., Entomologist in Charge of Banana Beetle Borer Investigations.

The observations and conclusions embodied in the following report cover the period from July to December, 1921.

(Plates 17 and 18.)

THE EGG.

Both field and laboratory observations have shown that oviposition has been continuous throughout the year. In the field, eggs have been found in corms and stems, while in the office the imagoes under observation (compare Table B) have deposited a large number of eggs in the pieces of corm on which they were feeding. In every case the eggs were laid singly, and generally just below the surface, in small, slightly-curved

* *Ib.* First Progress Report. Bull. Division Entomology and Vegetable Pathology. August, 1921. Reprint, “Queensland Agricultural Journal,” Vol., XVI., pp. 200–8, Sept., 1921.

burrows. That eggs are deposited in the plant below the surface of the soil was shown in some plants in which the larval tunnels were well towards the base of the corm, no trace of tunnelling being present through the upper half of the corm. This is, however, not general.

The following table gives the total number of eggs laid in each month by these different lots of beetles under observation. The beetles in each lot (given in Table B) comprised a proportion of males, but one not always constant, their number too varied, as death lessened this.

—	A.	B.	C.	D.	E.	F.	G.	I.	J.	K.	L.	M.	T
July	21	21	65	36	4	39	289	208	17	..	..	..
August	4	2	16	3	0	6	64	56	17	21	..	..
September	25	19	66	17	2	48	90	69	68	72	45	..	
October	104	81	235	111	22	144	343	323	196	268	142	..	
November	42	50	142	44	20	117	388	299	129	223	125	15	
To 15th December ..	7	4	7	5	2	7	25	29	9	24	33	3	
Individual totals July to 15th December	203	177	531	216	50	361	1,199	984	436	608	345	18	
Laid 25/5/21-30/6/21	39	60	149	44	0	84	354	339	..	..	..	..
Full Totals ..	242	237	680	260	50	445	1,553	1,323	436	608	345	18	

The egg production fell considerably with the cold weather, but did not cease completely, and recovered again with the advent of warmer climatic conditions. The marked drop in egg production in December is difficult to explain unless further observation shows the effect of hot weather to be similar to that of cold weather.

Oviposition does not seem to be marked into definite periods, as would occur with the development of one batch of eggs followed by a period of quiescence while another batch was developed, but rather to be a continuous function.

A large proportion of the eggs laid by these lots of beetles were transferred to incisions made in pieces of fresh corm, and were closely observed in order to ascertain the time taken for the egg to mature. The results of observation may be briefly summarised as follows:—

Eggs laid between 16th and 29th June, 1921, matured in 19 to 20 days (average).

Eggs laid between 29th June and 27th July, 1921, matured in 26 to 32 days (average)

Eggs laid between 29th July and 26th August, 1921, matured in 24 to 27 days (average).

Eggs laid between 29th August and 26th September, 1921, matured in 11 to 15 days (average).

Eggs laid between 26th September and 28th October, 1921, matured in 10 to 12 days (average).

Eggs laid between 28th October and 25th November, 1921, matured in 7 days (average)

The longest period passed in the egg stage was in the case of eggs laid between 25th and 27th July, 1921, the eggs maturing in 35 to 37 days. The variations of different series of eggs were more marked than are shown by these figures, but all showed the lengthening of the egg period as the cooler part of the year was being realised, and a

gradual decrease as warmer climatic conditions set in. The moisture content of the corm on to which the eggs were transferred as well as variations in temperature account largely for these variations, a dry condition of the corm as also a lowering of temperature inhibiting development.

[*Note*.—During the earlier portion of the period summarised above, great difficulty was experienced in carrying out this work through the development of fungus growths in the incisions in the corm to which the eggs were transferred. The long egg period allowed ample time for a heavy development of these growths which, often covering the eggs, destroyed a number of them, and always rendered observation difficult.

Small Staphylinid (sp.) larvæ and mites were also troublesome during the longer egg-periods.]

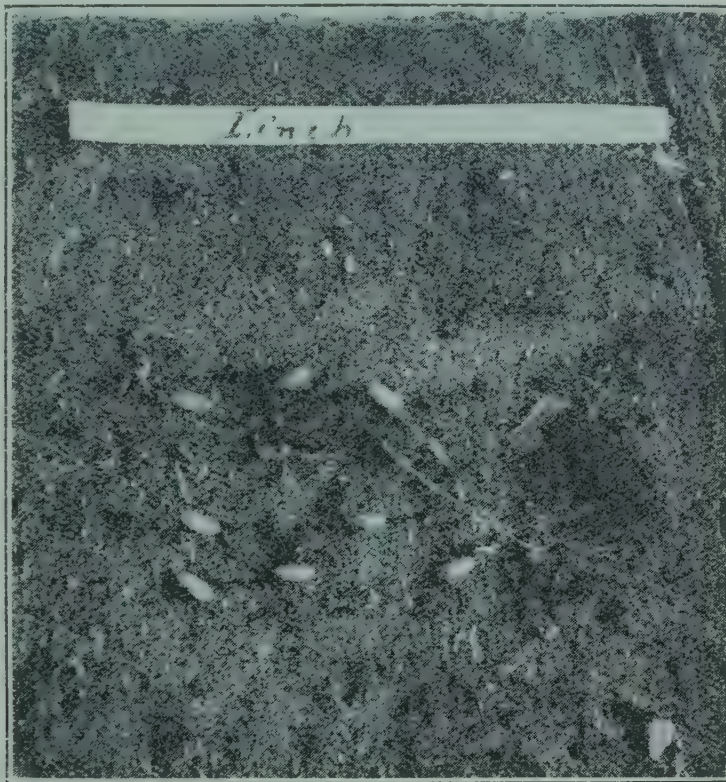


PLATE 17.—Eggs of *C. sordidus* transferred for observation.

LARVA AND PUPA.

On account of the larval and pupal stages being both passed within the corm, it has not always been possible to determine exactly the time passed in each of these stages. For this reason, generally, the larval and pupal periods have had to be calculated together and the period of each stage deduced from other independent observations.

It was found that from larvæ emerging in June and early in July, 1921, there were passed about 130 days in the larval and pupal stages, while from larvæ emerging in October there was passed less than half this time in the two stages; through November these periods were still further reduced. Details of these observations are given in Table A.

Pupæ collected in June matured in a minimum of 20 to 28 days, while in September this period was reduced to a minimum of 10 to 14 days. From this it may be assumed that the larval periods during the same time were at least 60 to 80 days and 30 to 40 days, respectively.

THE IMAGO OR BEETLE.

The average full life-cycle (from egg to imago), from eggs laid in June, was 120 days; in September, 62 to 63 days; in October, 48 to 59 days; in November, 31 to 33 days (only one observation).

No attractant or deterrent, either physical or chemical, has as yet been found effective for application to plantation requirements.

Continued observations on the length of life of the beetle show that it is a very long-lived insect. The results obtained from observations made on beetles feeding on corn in tins in the office that are embodied in Table B indicate this. In Lot F, for example, there have been no deaths since 9th May, which was only a few days after emergence of the beetles. In Lot A, collected 29th January, 1921, there are still 17 beetles alive (47.4 per cent.) out of a total of 38.

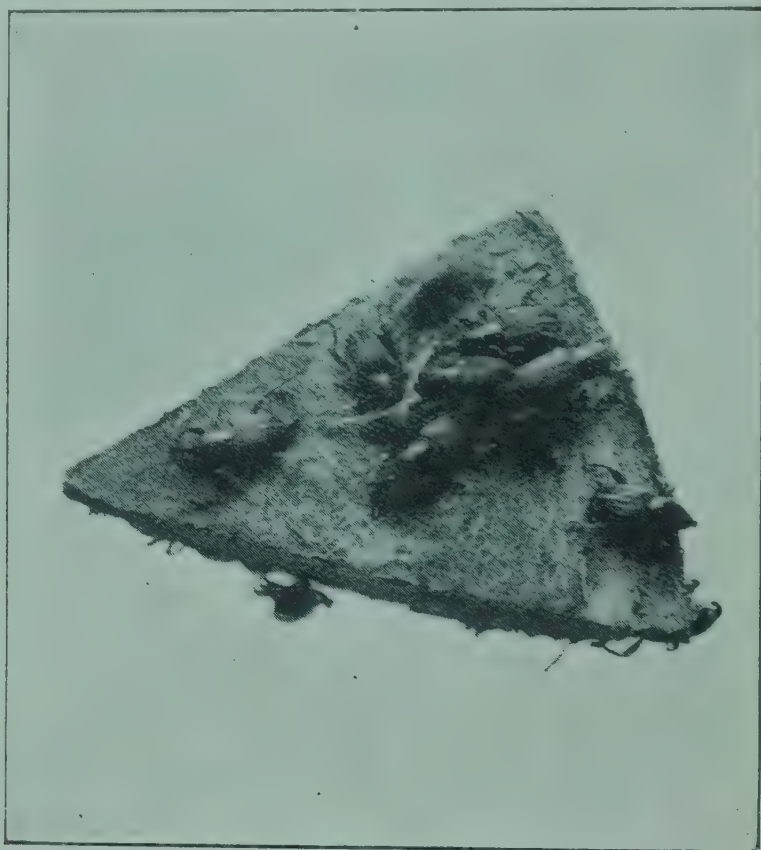


PLATE 18.—Newly emerged Imagos of *C. sordidus*.

The beetles comprising Lots E, M, N, and O were bred from pupæ; otherwise all the beetles were collected in the field, their age when taken being, of course, unknown.

During the winter months the rate of mortality amongst newly-emerged imagos was very high. This may have been due, in part, at least, to the rapid development of fungus growths on the corn affecting the imagoes before they were fully developed.

Both field and laboratory observations show that the imagoes will often begin to feed before they have attained their full (black) colour.

Eggs were deposited by the imagos of Lot E between 11th and 13th July, 1921; the imagos emerged from the pupæ between 22nd and 27th April, 1921, thus mating and subsequent development of eggs took place within 75 to 82 days of emergence of the imagoes. With the imagos of Lot M this period was very much shorter; the imagos emerged between 11th and 27th October, 1921, and the first eggs were deposited between 14th and 17th November, 1921; thus mating and egg-development took place within a maximum of 34 to 37 days from emergence.

The Department, acting in co-operation with that of New South Wales, secured from Java a consignment of a predaceous beetle (*Plaesius javanus*), belonging to the Ilisteridæ, an enemy of the banana beetle borer (*Cosmopilites sordidus*). This comprised 388 beetles, of which 304 were alive (slightly more than 78 per cent.). These were liberated in a small plantation where the banana beetle borer infestation was severe. They were liberated in this manner in order that they might be under closer control than if generally distributed, and under better conditions for observation. Jepson* states the period from egg to beetle of this parasite is a long one, so that it will not be possible to arrive at any conclusion on the activity of *P. javanus* for some time.

No indigenous parasites of *C. sordidus*, other than those mentioned in the First Report, have been found throughout the areas traversed.

PLANT RELATIONSHIPS.

Further observations in the field have failed to show any difference in the relative frequency of attack or relative degree of damage in different varieties of banana plants by *C. sordidus*. Neither has it been observed that disease of a plant, or plant portion, influences the selection of site for oviposition.

CONTROL.

It has been constantly found that, in "trapping" the beetle by means of corm "baits," the best "bait" is obtained by splitting the corm so as to include a small portion of the base of the stem; such baits present a moister surface for a longer time than those composed of the heart of the corm.

A series of tests has been started to ascertain the efficacy of poisoned "baits" as a means of destruction of the beetles. These tests are, however, not yet sufficiently far advanced to enable conclusions to be formed.

Old infested plantations that have been abandoned or left to run out are a most decided menace to the banana grower, as they represent large undisturbed breeding-grounds for the pest, from which it can, and does, spread into adjacent clean plantations. As an illustration of this point (one which cannot be too strongly stressed), a new plantation alongside an old infested area, though free from beetle borer early in the year, was found infested in the spring in the two rows adjoining the old area.

To reiterate previous advice on this matter, any old areas adjacent to plantations should be carefully examined, and, where beetle borer is found to be present, corm "baits" should be laid around the edge of, and, as far as possible, throughout the infested area; the baits must be carefully watched, and all beetles "trapped" must be destroyed. Whenever opportunity offers, it is to the grower's own advantage to dig out and destroy the infested material.

SUMMARY OF CONCLUSIONS.

1. The beetle has a long life, and the females deposit eggs continuously.

2. Breeding, although continuous throughout the year, is much slower in the winter months.

3. The results to date go to show how necessary it is to prevent the pest breeding by, as far as possible, destroying breeding-grounds and harbourage, and by destroying all beetles as soon after emergence as possible, by continuously "trapping."

* Jepson, Bull. 7, Dept. of Agric., Fiji, 1914. "... about six days in the egg stage, many months in the larval stage, and about four weeks in the pupal stage."

TABLE A.—PERIODS OF LIFE CYCLE.

Eggs Laid.	Larvæ emerged.	Larvæ Pupated.	Imagos Emerged.	Egg Period In days.	Larval Period in days.	+Pupal Period in days.	Full Life Cycle in days.
	26-28/6/21	..	20/10/21	18	114-116	..	132-134
8-10/6/21	3-6/7/21	..	12-22/10/21	20	98-111	..	118-131
13-16/6/21	3-6/7/21	..	11/10/21	19-17	97-100	..	116-117
13-16/6/21	3-6/7/21	..	15/10/21	19-20	87-88	..	106-108
29/6/21-1/7/21	19-20/7/21	..	20/11/21	12-13	(46-49)	..	59-61
20-22/9/21	2-5/10/21	..	2-6/12/21	12-13	(65-72)	..	71-77
20-22/9/21	2-5/10/21	..	18-23/11/21	14-13	39-49	..	53-62
22-26/9/21	5-10/10/21	by 15/11/21	21/11/21	13-11	(44)-49	..	56-60
22-26/9/21	3-8/10/21	by 15/11/21	19-20/11/21	10-13	44-46	..	54-59
22-26/9/21	5-8/10/21	by 15/11/21	28/11/21	12-13	41-44	p.p. 10	6-67
22-26/9/21	5-8/10/21	18/11/21	2/12/21	12-11	55-60	..	67-71
22-26/9/21	3-8/10/21	..	2-3/12/21	14-13	53-59	..	67-72
22-26/9/21	5-10/10/21	..	30/11/21	12-13	53-56	..	65-69
22-26/9/21	5-8/10/21	..	22-28/11/21	11-12	37-51	..	48-63
26/9/21-5/10/21	8-16/10/21	by 22/11/21	22-28/11/21	11-10	37-53	..	48-63
26/9/21-5/10/21	6-16/10/21	by 22/11/21	26-28/11/21	12	40-51	..	52-63
26/9/21-5/10/21	8-17/10/21	by 22/11/21	22-28/11/21	11-10	37-53	..	48-63
26/9/21-5/10/21	6-16/10/21	by 22/11/21	26-28/11/21	12-10	(41)-53	..	52-63
26/9/21-5/10/21	6-17/10/21	by 22/11/21	2-12/21	14-16	43-48	..	57-64
29/9/21-6/10/21	15-20/10/21	..	1-11/12/21	12-13	40-55	..	51-67
5-10/10/21	17-23/10/21	..	1-11/12/21	11	39-51	..	49-62
10-13/10/21	21-24/10/21	..	1-11/12/21	12-11	37-51	..	49-62
10-13/10/21	21-24/10/21	..	1-11/12/21	11	39/51	..	49-62
10-13/10/21	21-24/10/21	..	1-11/12/21	11-12	32-48	..	44-59
13-18/10/21	24-30/10/21	..	1-11/12/21	10-12	30-47	..	44-59
13-18/10/21	23-30/10/21	..	1-11/12/21	13-11	31-48	..	44-59
13-18/10/21	24-31/10/21	..	1-11/12/21	13-11	31-48	..	44-59
13-18/10/21	24-31/10/21	..	1-11/12/21	13-12	35-42	..	48-54
18-21/10/21	30/10/21-3/11/21	..	8-11/12/21	9	35-43	..	44-52
21-25/10/21	30/10/21-3/11/21	..	8-12/12/21	9	35-42	..	44-51
21-25/10/21	30/10/21-3/11/21	..	8-11/12/21	10-8	35-41	..	45-49
25-28/10/21	2-7/11/21	by 8/12/21	12-13/12/21	7	24-26	..	31-33
9-11/11/21	16-18/11/21	by 6/12/21	11/12/21				

TABLE B.—LONGEVITY OF IMAGOS.

	A.	B.	C.	D.	E.	F.	G.	H.	J.	K.	L.	M.	N.	O.
Date Collected.	29/1/21	7/2/21	12/2/21	20/4/21	27/4/21	5/5/21	21/5/21	4/6/21	13/7/21	1/8/21	16/9/21	11-27/10/21	15-24/10/21	23-28/10/21
Number Collected.	38	132	281	37	16	87	379	324	85	119	72	6	24	20
% Alive on—														
1/7/21	61	29.5	34.5	86	56	98	97	98.7	..	..	..	..	..	..
5/7/21	61	29.5	34	86	56	98	97	98	..	..	..	..	..	..
7/7/21	61	29.5	34	86	56	96.5	97	98	..	..	..	..	..	..
11/7/21	61	29.5	34	86	56	96.5	97	98	..	..	..	..	..	..
13/7/21	61	29.5	34	86	56	96.5	97	97.6	..	..	..	..	..	..
15/7/21	61	29.5	34	86	56	96.5	97	97.6	..	..	..	..	..	..
21/7/21	61	29.5	34	86	56	96.5	97	96.3	100	..	..	..	..	..
25/7/21	61	29.5	34	86	56	96.5	97	96.3	100	..	..	..	..	..
27/7/21	61	29.5	34	86	56	96.5	96.8	96.3	100	..	..	..	..	..
29/7/21	61	29.5	34	86	56	96.5	96.8	96.3	100	..	..	..	..	..
13/8/21	61	29.5	34	86	56	96.5	96.5	96.3	100	100	..	..	..	..
19/8/21	61	29.5	34	86	56	95.4	96	95.9	100	100	..	..	..	..
24/8/21	61	29.5	34	86	56	95.4	95.8	95.3	100	100	..	..	..	..
26/8/21	61	29.5	34	86	56	95.4	95.8	94.7	100	100	..	..	..	..
29/8/21	61	29.5	34	86	56	95.4	95.8	94.4	100	100	..	..	..	..
20/9/21	55.3	29.5	34	86	56	95.4	95.2	94.1	100	100	100	..	..	..
22/9/21	55.3	29.5	34	86	56	95.4	95.2	93.8	100	100	98.6	..	..	..
26/9/21	52.6	29.5	34	86	56	95.4	94.7	93.5	100	100	94.4	..	..	..
6/10/21	52.6	29.5	34	86	56	95.4	93.7	93.5	100	100	88.9	..	..	..
10/10/21	52.6	29.5	34	86	56	95.4	93.7	92.6	100	99.1	88.9	..	..	..
13/10/21	52.6	29.5	33.4	86	56	95.4	93.6	92.3	100	97.4	88.9	..	..	..
18/10/21	52.6	29.5	33.4	86	56	94.3	93.1	91.9	100	97.4	86.1	..	..	..
21/10/21	52.6	28.8	33.4	86	56	94.3	93.1	91.7	100	97.4	80.6	..	..	..
25/10/21	52.6	28.8	33.1	86	56	93.1	92.4	91.7	100	96.6	80.6	..	..	..
28/10/21	50	28.8	33.1	86	56	93.1	92.4	91.7	100	96.6	80.6	100	..	..
4/11/21	48.2	28.8	33.1	86	56	93.1	92.1	90.7	98.8	96.6	80.6	100	..	..
9/11/21	48.2	28.8	32.7	83.8	56	93.1	91.8	89.9	98.8	96.6	77.8	100	..	..
11/11/21	48.2	28.8	32	83.8	56	93.1	91.5	89.9	97.6	95.8	77.8	100	..	..
14/11/21	48.2	28.8	32	83.8	56	93.1	91.5	89.8	97.6	95.8	77.8	100	..	..
17/11/21	48.2	28.8	32	83.8	56	93.1	91.5	87.9	97.6	94.9	73.6	100	..	..
21/11/21	48.2	28.8	32	83.8	56	93.1	91.2	87.9	97.6	94.9	72.2	100	..	..
25/11/21	48.2	28	31.3	78.4	56	91.9	90.8	87.8	96.5	94.9	72.2	100	100	..
8/12/21	47.4	28	31.3	78.4	56	91.9	89.4	86.5	96.5	94.1	72.2	100	95.8	90
9/12/21	47.4	28	31.3	78.4	56	89.6	89.4	86.5	96.5	94.1	72.2	100	95.8	90
13/12/21	47.4	28	30.9	78.4	56	89.6	88.9	85.2	95.3	93.3	72.2	100	95.8	90
15/12/21	47.4	28	30.6	78.4	56	89.6	88.6	82.6	92.9	93.3	72.2	83.3	95.8	90

“Breeding-grounds” comprise old corms either in the stools or dug out and left lying on the ground, and also cut stems left lying on the ground. If these are chopped up into small pieces they will rot or dry up too quickly to allow time for the larvæ to reach maturity.

“Harbourage” consists principally of plant material lying in and around the stools. This forms an ideal shelter for the beetles. Decaying stems also form “harbourage” (and also, possibly, feeding-grounds) for the beetles.

CASTRATION OF THE FEMALE.

By A. H. CORY, M.R.C.V.S.

Ovariectomy (Speying).—The operation should be performed when the cow is in her prime and gives her greatest flow of milk, care being taken that she is in good health and moderate condition, not too plethoric; or, on the other hand, she must not be at all anæmic, and not in heat or pregnant. This operation may be performed in one of two ways—namely, by the flank or by the vagina—each operation having its special advantages. In the flank operation the animal may be operated upon either while standing or in the recumbent position. If standing, she should be placed against a wall or a partition and her head held by a strong assistant. The legs also must be secured to prevent the animal from kicking. A vertical incision should be made in the left flank, about the middle of the upper portion, care being taken not to make the opening too far down, in order to avoid the division of the circumflex artery which traverses that region. The operator should now make an opening through the peritoneum, which is best done with the fingers. Next introduce the hand and arm into the abdominal cavity and direct the hand backward toward the pelvis, searching for the horns of the uterus. Follow them up and the ovaries will easily be found. They should then be drawn outward and may be removed, either by the coraseur or by torsion. Closing and suturing the wound will complete the operation. An adhesive plaster bandage can be beneficially applied.

TAPE WORMS IN SHEEP AND LAMBS.

By A. H. CORY, M.R.C.V.S.

Symptoms.—Eight varieties of tapeworms are known to infest the bowels of sheep. Lambs will not fatten when harbouring these worms; they become unthrifty and hidebound, and the wool is hard and poor in quality. The animals appear stiff when moving, and generally hang behind the flock when being driven.

Tapeworms produce emaciation, with paleness of the mucous membrane of eyes, nose, mouth, &c. The function of the digestive organs is impaired, the cud being chewed irregularly, breath unpleasant, occasional colic, tympany of abdomen, and diarrhœa with mucus, in which is frequently found segments of the tapeworms. The sheep ultimately die from poverty and exhaustion.

Prevention.—Prevention consists in draining damp land, stagnant waterholes, &c., and by keeping uninfested sheep from known infested pastures. Infested pastures should, where practicable, be ploughed or dressed with salt, lime, or sulphate of iron, allowing about $\frac{1}{2}$ cwt. per acre. Avoid overstocking.

Treatment.—For treatment of 6-months-old lambs, fast animals for eight or twelve hours, and give the following:—

Oil of turpentine	..	..	..	..	1 drachm
Powdered areca nut	..	..	..	..	25 grains
Extract of male fern	..	..	..	..	15 drops
Linseed oil	..	..	..	..	1 oz.

Repeat the dose once weekly for three weeks. Increase the dose according to age of animal.

Where it is not practicable to drench sheep, 25 to 60 grains of areca nut (according to size of animal) should be given to each sheep, on two or three occasions, mixed in some bran or other food.

A lick composed of one part sulphate of iron to eight parts of salt should be available to sheep in troughs, allowing about $\frac{1}{2}$ oz. for each adult sheep.



PLATE 19.—LAGUNARIA PATERSONII.

A Flowering Tree of Brisbane Botanic Gardens described in the December Journal.
Natural Order Malvaceæ (Mallow and Hibiscus Family).

THE FRUIT-GROWING INDUSTRY—III.

BY ALBERT H. BENSON, M.R.A.C.

[The concluding article of series, the first of which appeared in the November Journal, relating to marketing methods and problems and other matters of peculiar interest to Queensland fruitgrowers. The first article dealt with inter- and intra- State distribution; the second covered the possibility of developing oversea markets for fresh fruit; and in his concluding observations Mr. Benson reviews the various methods of fruit preservation and their applicability to Queensland products and conditions.]

In the two previous articles I have confined my remarks to the marketing and distribution of fresh fruit. I now propose to deal with the question of storing fresh fruit when markets are over-supplied, and holding it for price improvement.

Fruit storage, obviously, relieves glutted markets, prolongs seasonal periods, stimulates demand, and increases consumption. As is well known, heat hastens the ripening of all kinds of fruit and cold retards it. It is, therefore, possible to store fresh fruit for a considerable length of time without deterioration, provided it is kept at a temperature that will suspend the ripening process. Different fruits require different temperatures. The hardier varieties of the temperate zone continue their development at a much lower temperature than tropical or sub-tropical products; in fact, firm varieties of apples and pears keep best at a temperature just above that at which they would freeze, whereas tropical fruit, such as the banana, develops (ripens) very slowly at 55 degrees F. Pineapples turn black at a temperature just above freezing point. Exact temperatures at which tropical and sub-tropical products may be stored are not definitely known, and experiments are now being conducted by the Queensland Department of Agriculture for the purpose of improving our present knowledge.

Many erroneous ideas exist as to the value of cool storage of fruit, one of the commonest being that any kind of fruit may be stored successfully, provided the temperature is right. No greater mistake could be made, as cool storage simply retards ripening, and once fruit is removed from store and placed under normal conditions it ripens very rapidly, and, if a quickly perishable product, soon decays. If it is of a long-keeping variety, its ripening proceeds much more slowly, and it can be retained for ample time to allow of its being retailed without appreciable loss. Cool storage merely retards development, and the fruit comes out practically in the same condition as when stored. The ripening process, which was suspended during the storage period, is resumed immediately on its return to ordinary conditions. It will, therefore, be seen that it is imperative to store only such fruit as may be held some time after release from the cool store; and it will not pay to store fruit that must be consumed immediately it is removed from store. Further, as cool storage costs something like 3d. per bushel case per week, it will not pay to hold inferior fruit. Only the very best, if stored for any length of time, may be profitably quitted.

As fruit does not develop or mature whilst in the cool store, it is essential for it to be fully developed, but not fully matured, before it is gathered, as immature fruit will remain unchanged in condition, and after release will not develop or ripen properly. Fully developed fruit will ripen when restored to normal conditions.

Fruit for cool storage should be perfect, consequently it should be handled, graded, and packed with the greatest possible care. Blemishes on fruit are intensified when the product is taken out of store and allowed to ripen. Selection is, therefore, limited to sorts that are good keepers and not easily bruised or otherwise blemished, such as firm-fleshed plums, apples, pears, clingstone peaches, grapes, and citrus varieties from which excessive skin moisture has been removed. Tropical fruits, such as unblemished pineapples and bananas, may also be successfully treated.

It will indubitably pay to store suitable temperate fruits for local consumption, but it is very doubtful if the storage of tropical fruits would prove equally profitable, except for such time as they may be in the cool store during transit to distant markets.

Many of the temperate fruits grown in this State are unsuitable for cool storage, as their edible condition is of comparatively short duration. They are soft, easily bruised, and rapidly rot if an attempt is made to keep them for any length of time. Generally they are fit only for immediate consumption, and this fact naturally limits their profitable production to the quantity that can be consumed during a limited period. The production, therefore, of such fruit, except in such quantities as available markets can absorb, is not recommended.

Having dealt with the markets for fresh fruit, we now come to the question of the best methods of preserving fruit for export. I do not purpose going into this

matter in detail, as it is a very wide subject and one more fitted for a text-book than a journal contribution; at the same time, as there is a very great deal of misunderstanding regarding fruit preservation, I think the following remarks will be useful to our growers:—

In the first place it must be clearly understood that only certain fruits, possessing specific qualities, can be preserved commercially; that is to say, profitably; though many other fruits not so suitable commercially, and which would not pay to preserve for the open market, can be preserved for home use. Several methods of commercially preserving fruit are in every-day use, and in order to be as brief as possible it is best to treat each separately and to see exactly what class of fruit is best adapted to each particular process.

1. *Drying Fruit.*—As the name implies, this method of preservation is simply the removal of superfluous moisture in fruit until the product is dry enough to keep without either fermenting or becoming mouldy. The drying is done either by exposing the fruit to the direct heat of the sun or by placing it in artificial driers, of which there are many types known as “Fruit Driers,” “Evaporators,” or “Dehydrators.” The principle involved in all artificial methods of drying is the same, viz.:—The extraction of superfluous moisture from fruit by means of heat, which is generated in various ways and is applied to the fruit in the form of hot air.

Many kinds of artificial driers are now in use, some of which are very simple in their construction, whereas in others, such as up-to-date dehydrators, the hot air is under absolute control and the cost of treating the fruit is reduced to a minimum. There is a general want of knowledge amongst our fruitgrowers and others regarding the class of fruit that is most suitable for drying, many persons apparently thinking, if one can judge from the recent expressions of opinion that have appeared in the public Press on the subject of “Dehydration,” that any kind of fruit can be treated successfully, and that, therefore, drying, or dehydration, as it is now called, will prove the means by which our surplus fruit can be utilised to advantage. I am sorry to say that I cannot agree with this opinion, as much of the fruit grown in Queensland is by no means suitable for drying, as, if so treated, it could not be converted into a marketable article that would realise a price high enough to pay the cost of manufacture.

In order to produce a high-class dried article, and there is no market for anything else, it is necessary to select fruits having high sugar content and firm flesh, that will dry heavy, for if the fruit to be treated is deficient in sugar, the dried product will be deficient in quantity and poor in quality.

Fresh fruit consists mainly of water containing a variable amount of sugar in solution, fibre, pectine or fruit jelly, and ash, and when the water is extracted only the sugar, fibre, pectine, and ash are left. If there is a deficiency of sugar or pectine in the fresh fruit, the dried product is of very little value, as it will consist largely of skin and fibre. In order to produce fruits, such as peaches, apricots, figs, raisins, grapes, sultanas, currants, or dates suitable for drying, they must be grown in a hot, dry climate, as sun heat is necessary to produce the sugar. It is for this reason that hot and dry districts, such as Mildura, California, Smyrna, Arabia, and Northern Africa have proved so suitable for the production of commercial lines of dried fruit. Prunes and drying plums can be grown in cooler climates, but even these fruits are richer in sugar and dry heavier when grown in a district having a hot, dry summer and an abundance of sunshine.

Apples of firm texture grown in cool climates, however, dry well, and ripe bananas may be converted into an excellent dried product known as banana figs, while the green fruit, when dried and ground, makes an excellent flour.

Regarding individual fruits, peaches must be rich in sugar and possess a solid, firm flesh. Yellow-flushed freestone varieties are the best. Apricots must be rich in sugar, the flesh firm and of a good deep colour, and free from fibre. Figs—only very rich, sweet, red-fleshed white varieties produce a first-class dried article, such as the so-called Turkish fig of commerce, which is produced mainly in Smyrna, and latterly in both California and South Australia, under dry and hot conditions. Only certain varieties of grapes are suitable for the manufacture of raisins, sultanas, and currants, and they should be grown under hot and dry conditions, as they must be very high in sugar and allowed to become dead ripe if a good marketable product is required. As regards dates, this fruit is only grown to perfection in very hot and dry districts.

It will thus be seen that as far as this State is concerned there is no great chance of our competing successfully in the open markets with most dried fruits, as the climate of our principal fruit-producing districts is not as suitable for the production of fruits suitable for drying as other parts of the Commonwealth, and we would, therefore, be under a great disadvantage when competing with more favoured districts. Apples can be dried for home and local consumption, but as it takes 8 lb. of a good

drying variety to 1 lb. of dried fruit, which, as it is only worth, at the outside, one shilling, it does not leave a very big margin for the fresh fruit.

The question of drying pineapples has recently been given a large amount of attention, and it is to be hoped that it will prove a successful means of utilising this fruit. It is, however, a new industry, and a market will have to be made for the product, as it is practically unknown at present.

Since writing the preceding paragraph, confirmatory evidence of same has been received from the Queensland Agent-General in London, who states, when referring to a market for dehydrated pineapples, that "the London experience does not appear to be very encouraging," and backs this statement up by giving the following advice:—"It is believed that until the market is established, low prices would rule; consequently it is not advisable to send more than 5 tons for a beginning."

2. *Canning Fruit*.—The success of canning fruits depends on the sterilization of suitable varieties of fresh fruits by means of boiling water or syrup, and hermetically sealing such fruit. In commercial canning, the fruit, after being properly prepared, is placed in suitable cans, which are then passed through the exhaust, on emerging from which the syrup is added, the lid of the can put on, and the cooking completed. Fruit so treated keeps indefinitely, provided it has been thoroughly sterilized and the can is hermetically sealed.

The cost of canning is such that only high-class fruit will now pay to handle, and at present practically the only fruit we have in sufficient quantity to keep a cannery running is the pineapple. With regard to this fruit, we have proved that Queensland can put up a very high-class article, provided necessary care and attention is given to its preparation.

The Stanthorpe District is capable of producing a high-class yellow-fleshed cling-stone peach that is in every way suitable for canning, as we can get the size, colour, and firmness of fruit required for a first-class canned article. Recently a large number of suitable canning varieties have been planted, and these will be coming into profit shortly. High-class plums suitable for canning can also be produced, but so far the price realised for the fresh fruit prevents its being used for canning. The same remark applies to canning pears, such as the "Bartlett," and to apricots suitable for canning.

3. *Jam Making*.—Any good, sound, firm-fleshed temperate fruits, and all berries can be converted into jam, but watery, soft-fleshed fruits with a low sugar-content are not suitable. Apricots, all kinds of European plums, cherry plums, strawberries, cape gooseberries, and pineapples sell readily when made into jam, and there is a fair local demand for fig jam, and peach jam made from good, firm, yellow-fleshed fruit, but little demand for these jams for export, or for jams made from melons, apples, and other varieties of fruit, excepting a high-class apple jelly.

Good marmalade meets with a fair local demand, and I am of opinion that it is possible to build up a good oversea trade for this preserve.

4. *Pulping*.—This is a means of storing jam fruits during the height of a season, and holding them for final treatment until an opportunity for converting them into jam occurs. Only first-class jam fruits will pay to pulp, as there is no demand for inferior pulp, such as that made from watery peaches, nectarines, or Japanese plums, and it is only wasting time and money to put it up. Pulping consists of sterilizing the fresh fruit by boiling and storing it in hermetically-sealed tins till it is required for use.

5. *Candying and Crystallising*.—The Queensland climate lends itself to these methods of fruit preservation, and I believe that a profitable trade could be worked up by an energetic firm specialising in this line. We have proved that we can turn out candied peel equal to, if not better than, any produced elsewhere, and there is, therefore, no reason why we should not specialise in glace and crystalised fruits, for which there is a world's market.

6. *Cider*.—There is no reason why good cider should not be made in Queensland under artificial conditions, as it will be necessary to provide cool rooms in which to ferment the must. Even so, the cost of manufacture should not be excessive, and it would provide a market for a large quantity of fruit that would otherwise go to waste.

7. *Sterilized Fruit Juice*.—The sterilization of various fruit juices, such as pineapple juice and grape juice, and placing them on the market as temperance drinks, is another neglected branch of our fruit industry, but one that has become of very great importance in the United States since that country went "dry." It is an industry that should pay well here, as there should be a good demand for pure fruit juice, both for cooking and as a beverage. For the latter it would certainly be preferable and infinitely more wholesome than the majority of the so-called soft drinks now so largely consumed.

In this series of articles I have endeavoured to show the class of fruits to which our growers should confine their attention, how to obtain markets for such fruit in the fresh state, and the class of fruit that can be utilised by drying or otherwise preserving. In conclusion, I submit the following suggestions for the careful consideration of all growers:—

1. Only grow such varieties of fruit as your soil and climate is best suited for.
2. Grow only first-class fruit that can be used not solely for the fresh fruit trade, but that will keep and carry well and may be canned, dried, or otherwise preserved. Do not grow rubbish.
3. Handle your fruit carefully, grade it properly, and pack it honestly.
4. Encourage the consumption of fruit in every way you can by advertising its value as a food and as Nature's greatest gift to man for the preservation of his health. See that it forms a part of every meal, and is always present on every hotel dining table, either in the fresh or preserved form. Get everyone to eat fruit; and instead of over-producing fruit you will have to increase the size of your orchard to meet the demand.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER, 1921 AND 1920, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Nov.	No. of Years' Records.	Nov., 1921.	Nov., 1920.		Nov.	No. of Years' Records.	Nov., 1921.	Nov., 1920.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton	2.15	20	Nil	0.59	Nambour	3.85	25	3.98	6.57
Cairns	4.16	39	2.80	4.66	Nanango	2.61	39	1.09	3.05
Cardwell	4.21	49	0.42	2.87	Rockhampton ...	2.17	34	1.93	3.24
Cooktown	2.80	45	0.80	0.97	Woodford	3.18	34	3.56	6.25
Herberton	2.43	34	0.10	0.85					
Ingham	3.96	29	0.54	2.27	<i>Darling Downs.</i>				
Innisfail	6.48	40	0.89	4.89	Dalby	2.53	51	1.74	1.62
Mossman	4.80	13	1.12	4.18	Emu Vale	2.59	25	2.06	3.91
Townsville	1.88	50	0.01	0.73	Jimbour	2.38	33	1.79	2.18
					Miles	2.52	36	1.14	1.38
<i>Central Coast.</i>					Stanthorpe	2.72	48	2.24	2.19
Ayr	1.79	34	0.14	1.81	Toowoomba	3.30	49	1.34	6.06
Bowen	1.34	50	Nil	1.15	Warwick	2.57	34	3.36	2.76
Charters Towers ...	1.62	39	Nil	0.15					
Mackay	2.94	50	1.46	1.92	<i>Maranoa.</i>				
Proserpine	3.14	18	0.94	1.46	Roma	2.07	47	1.12	0.99
St. Lawrence	2.38	50	0.53	1.48					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden	2.72	22	2.42	2.56	Bungeworgorai ...	1.99	7	1.77	0.76
Bundaberg	2.63	38	1.68	2.17	Gatton College ...	2.70	22	0.48	3.36
Brisbane	3.69	70	3.24	6.28	Gindie	2.12	22	0.05	0.85
Childers	2.79	26	3.24	2.29	Hermitage	2.59	15	2.81	3.89
Crohamhurst	4.39	30	2.76	5.54	Kairi	2.44	7	0.07	1.18
Esk	3.18	34	1.53	5.10	Sugar Experiment				
Gayndah	2.83	50	1.38	2.59	Station, Mackay ...	2.68	24	1.32	2.33
Gympie	3.16	51	3.01	4.56	Warren	3.29	7	4.30	3.85
Glasshouse M'tains	3.77	13	3.48	5.62					
Kilkivan	2.57	42	2.96	5.77					
Maryborough	3.10	50	3.32	2.58					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year, and for the same period of 1920, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND, State Meteorologist.

Editorial Notes.

Australia's Future.

The timely and optimistic note struck by Sir Denison Miller, Governor of the Commonwealth Bank, at a large gathering of financial men and journalists in Sydney recently, reminds us that citizenship of the Commonwealth is a privilege that cannot be lightly regarded. Of all the nations drawn into the vortex of the great war, Australia, perhaps, proved the most buoyant, and the remarkable figures quoted by Sir Denison Miller may be accepted as an index of Australia's great wealth, and, if given elbow room, a basis upon which to build a reliable forecast of a glittering future. During the war and pooling periods Australia sold to the Imperial authorities wool to the value of £175,667,000; meat, from Queensland and New South Wales, £10,309,000; butter and rabbits, £21,115,000; wheat (including flour in wheat equivalent), £51,000,000; and metals, £41,000,000. Australians have invested £270,000,000 in Commonwealth loans, £163,000,000 in State loans, and £153,000,000 amongst 3,256,319 depositors in the savings banks, making a grand total of nearly £741,000,000 invested. Over 1,000,000 heads of families own and live in their own homes. The number of sheep, cattle, and other live stock is sufficient for many more millions of people than the country at present carries, and in one State alone there is sufficient coal to last, at the present rate of consumption, for 10,500 years. In addition, there are unbounded supplies of minerals to be mined. If secured from external aggression and standing on the two legs of primary and secondary industry, with broad acres of virgin soil as the base of one and unlimited raw material of the other, Australia with Time on her side has a future the greatness which is but mistily perceived. Australians, 98 per cent. of whom are of pure British stock, have in their great White Continent one of the finest countries in the world, with illimitable resources and millions of acres of Crown lands suitable for settlement and development, and there is room for many millions more to share their shining heritage.

* * * * *

The Butter Position.

The present unsatisfactory condition of the butter market is due to a large extent to unnatural restriction of trade brought about by a continuance of the operation of war measures long after their necessity had ceased to exist. As the result of rigid rationing of butter in the United Kingdom there are now vast cold storage accumulations. The rationing was at such a rate that reduction of accumulated supplies became a very slow process, the channels of distribution were blocked, and newer consignments could not be cleared as they came to hand. A general decline in values followed, and the Imperial authorities in their wisdom did not deem it fit to quit stocks quickly and so make the first loss the least. Through their retention of the produce the market has become practically only a receiving one. As well as the consequent disorganisation of the industry, there is the fact that margarine manufacturers have been given another opportunity to popularise their product. When it became known here that it was the intention of the Imperial Government to immediately release stocks held in storage, an effort was made by those associated with the industry in Australia to persuade London to unload gradually, and therefore avoid a rapid declension in values and the grave possibility of reducing the industry to chaos. To this overture the Imperial people have made a definite proposition, but it is understood that, so far, the butter held by them has not been quitted. The market has become very appreciably affected in consequence, and at present it is hard to say what is the value of butter. It is significant that Tooley street has reduced the amount of the advance on surplus butter by about 2d. per lb. One possible way out of the difficulty is for the associated companies concerned to set up an intelligence section to ascertain what markets are available in all butter-consuming countries and offering the best opening for disposal. The present position could have been obviated to a large extent by releasing butter from store more quickly when consumers were clamouring for it. As it is, vendors are faced with the problem of selling two seasons' produce in one. The existing difficulty is probably only a temporary kink in market organisation, and is paralleled in the Japanese silk trade when, recently, over-production was followed by a slump due to an effort to dispose of the product of two years' manufacture for one year's use of material. But at the back of the butter position is the minor menace of margarine, the manufacture of which increased to an enormous extent—as much as 10,000 tons per week—during the war.

A Butter Pool.

Among Queensland butter producers there is a pronounced feeling in favour of the creation of a butter pool, and the Queensland Co-operative Dairy Companies' Association is taking the matter energetically in hand. The slump in butter and the uncertain conditions that have ruled in respect to export since the return to open marketing has directed the minds of manufacturers to the desirability, if not the necessity, for complete co-operation and co-ordination in marketing, both locally and overseas. In Victoria, where there was a rush for open-market conditions upon the termination of the Imperial purchase contract, and marked opposition to joining in with Queensland and New South Wales in the winter pool, producers now realise that they have lost thousands of pounds by standing out. The result is there appears to be a sharp revulsion of feeling in favour of constituting an all-embracing pool on co-operative lines.

General Notes.

A NEW WHEAT DISEASE.

In the course of a lecture delivered by Mr. F. F. Coleman, Expert under the Pure Seeds Acts, before the Toowoomba Chamber of Commerce recently, reference was made to the discovery of what appears to be a new wheat disease. The appearance of discolouration on the basal nodes and internodes of some wheat growing on the Downs led to a close investigation of the cause.

Specimens of affected wheat stalks, with grain attached, were procured and submitted to Mr. Henry Tryon, Entomologist-in-Chief, who, after obtaining and examining further specimens, advised that the symptoms of "disease" occurrence were due to the attacks of a minute mite that apparently establishes itself, in the first instance, in the sheathing base (or leaf sheaf) of the flag, and thence effects an entrance into the substance of the straw, especially in the neighbourhood of the node, where leaf-sheaf and culm unite. This disease has not previously been reported as associated with the wheat plant in Australia. The discovery shows that the customary precautions in examining seed wheat destined for agricultural areas are fully justified, and is an instance of the value of the work accomplished by lesser-known sections of the Department of Agriculture and Stock.

[Mr. Tryon informs us that this *Acarus* is a *Tarsonymus* comparable with the species noted by Reuter as injuring wheat in Finland.—Ed.]

PUBLICATIONS RECEIVED.

The Agricultural Gazette of Canada (Nov.-Dec., 1921), has among its leading topics an article descriptive of the efforts of the Dominion Live Stock Branch for the improvement of Canada's herds and flocks. Very practical assistance is given to farmers who, under the "Car Lot Policy," are paid reasonable travelling expenses to central stock sales for the purpose of purchasing stock for return to country points. In Eastern Canada the assistance is restricted to the purchase of female breeding stock—cattle, sheep, or pigs. In Western Canada the policy covers stores in addition to breeders. Purchasers are required to fulfill certain conditions in connection with their truckings and to give satisfactory assurance that none of the stock is purchased for speculative purposes. It is claimed that this policy has proved very valuable educationally, and not expensive. The cost of cattle shipped under its terms in the course of a triennial period averaged only 59 cents per head. Sheep in the same period averaged only 18½ cents per head. "The Free Freight Policy" is another scheme to assist the small stockowner. It was designed to prevent as far as possible the slaughter or exportation of useful heifers, young ewes, and young sows offered for sale on the open market at the central stockyards. Under this policy farmers are entitled to truck from saleyards to country points female breeding stock of the classes mentioned, freight free, provided the stock was not purchased for speculative purposes. "Cow Testing, 1920," is another contribution illuminative of progressive Canadian methods of herd improvement. An account of the organization of Alberta potato growers is also interesting to Queensland co-operators.

The New Zealand Journal of Agriculture (Dec., 1921), contains in "The Grasslands of New Zealand," an account of the application of the principles of pasture establishment. Other informative features are continued notes on commercial potato-growing, and account of sugar-beet trials and analyses, and notes on lucerne experiments at Ashburton, with special bearing on the fertilizer question.

The Canterbury Agricultural College Magazine (N.Z.) (Dec. 1921), is a bright production, containing an account of the student's doings. In an editorial it asks: "What are our ideals? To some this may be a startling question. The absorbing interests of our material, practical life are apt to crowd out and banish from our minds the question of our purpose and place in the community. But, however busy we are, and however little thought we give to it, one thing stands out clearly: We may not give verbal expression to our thoughts and ideals, but we 'live'—and by our lives we express our ideals."

The *Journal of the Department of Agriculture of South Australia* (Dec. 1921), has among its main topics an important paper on "Forage Poisoning" by Lionel B. Bull, D.V. Sc.

The *Journal of Economic Entomology* (U.S.A.) for June, 1921, devotes much space to the efficiency of grasshopper baits.

Dates and Date Cultivation of 'Iraq, parts I. and II., Memoir III., Agricultural Directorate, Ministry of Interior, Mesopotamia, by V. H. W. Dowson, is an account of the results of an investigation into the yield of date palms on the Shat Al 'Arab.

PREPARATION OF COTTON SEED FOR PLANTING.

Mr. W. H. Drummond (Springsure) writes:—

"I have planted 11 acres of cotton. . . . It is doing well, and I intend to plant a further 4 acres.

"For planting I used a maize drill, and found it a complete success, but only by the method I used. My method is as follows:—Boil 2 pints of flour in 4 gallons of water, place the cotton seed in this solution, squeeze or drain it, and then roll the seed in dry ashes, using an old washing tub for this purpose; then sift through a wire screen to separate matted seed; then spread out to dry. I found that by preparing the seed in this way it worked in the drill as easily as maize. I planted 4 acres a day as well as preparing the seed. Ashes and sand were tried by themselves, but this proved unsatisfactory. I found 4 gallons of boiled flour quite sufficient for the 11 acres."

Answers to Correspondents.

WORMS IN HORSES.

"INQUIRER" (Murgon)—

The Government Veterinary Surgeon, Mr. A. H. Cory, M.R.C.V.S., recommends the following treatment for worms in horses:—

"The horse should be stabled overnight and fasted. In the morning a drench containing 2 oz. of turpentine and 1 pint of raw linseed oil should be given (slowly and carefully). If the horse attempts to cough, lower his head immediately.

"The following powder will also be found beneficial if given in the morning in a bran mash or some damp food:—

Santonin	..	..	..	..	15 grains
Sulphate of iron	..	..	..	..	1 drachm
Gentian	..	..	..	..	4 drachms

"After three weeks' or a month's interval, the first drench can be repeated if thought necessary."

ZAMIA.

P.J.—The Government Botanist, Mr. C. T. White, F.L.S., advises:—

"(1.) All members of the *Zamia* family (*Cycadaceæ*) are reputed to be poisonous to stock.

"(2.) All parts of the plants, with the exception of the core or pith, are reputed to be poisonous. The disease known as 'ricketts' has been induced by experimentally feeding the leaves to stock, but the seeds are generally looked upon as being more poisonous.

"(3.) Eradication in the taller-growing species, such as *Cycas media*, consists of cutting the stem down (it never shoots again), or a notch is cut in and an arsenical solution or other poison poured in. In the stemless species, such as the wild pineapple (*Macrozamia spiralis*) eradication is effected by driving an iron spike into the crown and working it backwards and forwards so as to damage the 'bulb' below, and to make the destruction quicker and surer an arsenical solution may be poured in. Where the plants are few in number they may be grubbed out.

"(4.) *Treatment of Affected Stock.*—Little can be done in this direction. The Chief Inspector of Stock, Major A. J. Cory, M.R.C.V.S., has recommended the following:—'The first action to be taken is to prevent the animals gaining access to the plant, and a purgative should be given to the affected animals, consisting of $\frac{3}{4}$ to 1 lb. of Epsom salts in 3 pints of water, as a drench. After the drench has worked, the animals should be given the following powder, either mixed in food or in a pint of cold water:—

Potassium iodide	..	..	..	..	2 drachms
Powdered nux vomica	..	..	..	..	1 drachm
Powdered gentian	..	..	..	..	4 drachms

“(5.) *Uses*.—In Western Australia the core of the stem or bulb has been used as a stock food with a certain amount of success, the pith being grated or ground up and boiled in about twice its weight in water. As the solution cools it becomes thick and jelly-like, and is said to be useful as a food for pigs, poultry, and hand-fed calves, the poisonous principle in the stem being rapidly removed by heat. The pith has also been spoken of favourably as a source of industrial alcohol.”

POP CORN.

“Farmer,” Mount Kent, Nobby.—The Director of Agriculture (Mr. H. C. Quodling) advises you as follows:—

“Climatic conditions and class of soil necessary for the successful production of maize are equally suited to the needs of pop corn, and land intended for its growth should receive the same careful preliminary cultivation.

“Sowings may be made from August, or as soon as all danger from frost is over, to early in January, in drills spaced 3 ft. apart, distributing the seed thinly, in order that the plants may be from 12 to 16 in. apart in the rows. Three to four pounds of seed are sufficient to sow 1 acre.

“Careful and frequent inter-row cultivation should be carried out, once the plant is above the surface and the rows can be distinctly defined, in order to keep down weed growths and prevent evaporation of soil moisture.

“Pop corn does not grow to the same height as that reached by larger-grained varieties, but carries a greater quantity of lower leaves, and, under favourable conditions, two and sometimes three cobs are produced on the one plant.

“The ear of pop corn, being smaller in diameter than that of ordinary corn, some adjustment of the corn sheller is necessary when threshing.

“Owing to the smallness of the grain, it will be found that greater efficiency is obtained and less waste occurs when the ear is husked prior to shelling. In using the husker and sheller, unless the riddles are of a large capacity, considerable grain is apt to be carried out, with the husk, especially when the machine is being run to its full capacity.

“Two of the most suitable varieties for Queensland conditions are white rice and golden tom thumb.”

LANTANA POISONING.

S.F.S.P. (Gordonvale).—

1. There is no known method of dealing with lantana poisoning in horses.
2. There is no satisfactory remedy for lantana poisoning in cattle. Most cattlemen administer a strong purgative.
3. Get rid of the lantana.

PISE CONSTRUCTION.

A.M. (Mackay).—Mr. Morry, the departmental surveyor, to whom your inquiry was referred, advises as follows:—

“Adobe blocks should not be more than 12 in. by 6 in. wide and 6 in. deep. The time they would take to dry would depend on the weather, but with good drying conditions they should be fit to use in two weeks. No foundations other than the natural earth are required for pisé buildings, as stated in the specifications published in the Journal. The only mortar used is mud of the same material, freed from stones by running through a sieve while in a liquid state. It will afterwards thicken like putty and will then be fit to use.”

J.E. (Moola).—

Your house has stood pretty well, considering the way in which it was built. Had wire netting been used on the saplings, the mud plaster would not have fallen off. If possible, even now wire netting should be put on in small patches where necessary, then plastered over with mud and thickened with some fibrous material. If netting cannot be used, drive nails into the saplings, then plaster as before. These will hold the plaster when patching is completed. Give it all, inside and out, two good coats of limewash.

WATERCOURSE BOUNDARY.

A.G.N. (Howard).—

The ordinary water line on each bank of the creek is the boundary of the properties on the frontage, consequently a property cannot be held to be completely enclosed unless fenced along the creek. Information *re* impounding laws can be obtained from your local shire clerk or at the nearest C.P.S. office.

ALGAROBIA AND CAROB BEAN SEED.

Supplies are expected from overseas. In the meantime applications for seed are being registered.

SWAMP GRASS (*POA AQUATICA*).

E.M. and other Inquirers.—

The Farmers' Co-operative Distributing Coy., Brisbane, are selling agents for this grass, and are prepared to supply roots at 45s. per bag f.o.b. Brisbane. This grass does not seed too readily, and is propagated usually by division of the roots.

GREEN SPOTS IN CHEESE.

W.P. (Nigger Creek, *via* Herberton).—The Chief Dairy Expert, Mr. E. Graham, advises as follows:—

“Green spots in cheese are attributable to the growth of pigmentary moulds. It is possible that the milk from which the cheese is made, or the cheese itself, may be affected with the mould. Generally, moulds of this class grow profusely on wood which is in a state of decay, and the organism is transferred from the decaying wood to the milk or the newly made cheese per medium of the atmosphere. It is possible to prevent the growth of mould injuring the cheese. Foremost, it must be remembered that moulds for their growth require both moisture and oxygen, and, provided that the rind of the cheese is firm and unbroken, it is then impossible for the mould growth to penetrate beyond the rind of the cheese, and when restricted in this way the quality of the cheese is not appreciably interfered with. It is only when the mould is able to penetrate into the cracks or crevices in the cheese that material damage to the quality of the cheese results. In toasting the surface of the cheese, the exterior of the face becomes sealed as a result, and it is then found that the mould growth is capable of doing little damage, and there is no doubt that if the outer lines of the cheese can be kept intact in the process of manufacture it will be found similarly impervious to mould growth, as the rind of the cheese readily dries out and fails to supply an adequate amount of moisture to permit of the serious growth of mould. Even if mould does attach itself to the exterior surface of the cheese, it may readily be removed by wiping the cheese over with a piece of clean hessian or other rough cloth.”

Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

The excellent rains recently experienced should have a heartening effect on all farming operations, as a good season is assured.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing, providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production. Weather conditions, particularly the recent heavy and continuous rains, have interfered a great deal with farming operations. Although abundant supplies of grasses are in evidence, provision should be made for the inevitable period, at maturity, when these lose their succulence.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick growing crops of the former description suitable for coastal districts and localities, where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the *Setaria* family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milk cows in May and June, attention should be given to planters' friend (so called imphee) and to orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a denseness of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In the majority of agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of one pint of formalin (40 per cent. strength) to 24 gallons of water should be made up, and the potatoes immersed for one hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate: 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig-raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

Orchard Notes for February.

THE COAST DISTRICTS

February in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot, as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smoothleaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery

with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can, but smaller fruit, that must not be less than 4 in. or, better still, 4½ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyaniding, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground, but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries can be planted towards the end of the month, and, if early-ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing, is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a manner that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least, before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts, winemaking will be in progress. Here, again, care is necessary, as the better the condition in which the fruit can be brought to the press the better the chance of producing a high-class wine.

Where necessary, citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5.0	6.51	5.24	6.46	5.45	6.25
2	5.1	6.51	5.25	6.46	5.45	6.24
3	5.1	6.51	5.26	6.45	5.46	6.23
4	5.2	6.51	5.27	6.45	5.46	6.22
5	5.3	6.52	5.28	6.44	5.47	6.20
6	5.4	6.52	5.28	6.43	5.48	6.19
7	5.4	6.52	5.29	6.42	5.49	6.18
8	5.5	6.52	5.30	6.42	5.50	6.17
9	5.6	6.52	5.31	6.41	5.50	6.16
10	5.6	6.52	5.31	6.41	5.51	6.15
11	5.7	6.52	5.32	6.40	5.51	6.14
12	5.8	6.52	5.33	6.39	5.52	6.13
13	5.9	6.52	5.34	6.38	5.52	6.12
14	5.9	6.52	5.35	6.38	5.53	6.11
15	5.10	6.52	5.35	6.37	5.53	6.9
16	5.11	6.52	5.36	6.36	5.54	6.8
17	5.12	6.52	5.37	6.35	5.54	6.7
18	5.12	6.52	5.38	6.34	5.55	6.6
19	5.13	6.52	5.38	6.34	5.55	6.5
20	5.14	6.52	5.39	6.33	5.56	6.4
21	5.15	6.51	5.39	6.32	5.56	6.3
22	5.16	6.51	5.40	6.31	5.57	6.2
23	5.17	6.51	5.40	6.31	5.57	6.1
24	5.18	6.50	5.41	6.30	5.58	5.59
25	5.19	6.50	5.41	6.29	5.58	5.58
26	5.19	6.50	5.42	6.28	5.59	5.57
27	5.20	6.49	5.43	6.27	6.0	5.56
28	5.21	6.49	5.44	6.26	6.0	5.55
29	5.22	6.48	...	...	6.1	5.54
30	5.23	6.48	...	...	6.1	5.53
31	5.23	6.47	...	...	6.2	5.52

PHASES OF THE MOON, ECLIPSES, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when summer time is not in force.

H. M.
 6 January (First Quarter 8 24 p.m.
 14 " ○ Full Moon 12 37 a.m.
 20 ") Last Quarter 4 0 p.m.
 28 " ● New Moon 9 48 a.m.
 Apogee on 3rd at 8.54 a.m.
 " on 30th at 10.24 p.m.
 Perigee on 15th at 9.48 a.m.

5 February (First Quarter 2 52 p.m.
 12 " ○ Full Moon 11 18 a.m.
 19 ") Last Quarter 4 18 a.m.
 27 " ● New Moon 4 48 a.m.
 Perigee on 12th at 9.0 p.m.
 Apogee on 27th at 12.48 a.m.

7 March (First Quarter 5 22 a.m.
 13 " ○ Full Moon 9 14 p.m.
 20 ") Last Quarter 6 43 p.m.
 28 " ● New Moon 11 3 p.m.
 Perigee on 13th at 9.30 a.m.
 Apogee on 26th at 5.36 a.m.

The splendid phenomenon of an annular or ring-shaped eclipse of the sun will be seen, if clouds do not intervene, in North Africa (including part of the Suez Canal) and in South America on 27th and 28th March.

The only other eclipse of the year will be the Great Australian Total Eclipse of the Sun on 21st September, of which special particulars will be given.

The apparent proximity of the moon and Delta Tauri early in the evening of 9th January will be of interest to those who possess telescopes or binoculars, also the occultation of Omicron Leonis on the 16th, about 1 o'clock in the morning. On 7th February Delta Tauri will be occulted by the moon about 4 o'clock in the morning, also another small star in the same constellation half an hour later, followed by another within three quarters of an hour after that.

The occultation of Jupiter by the moon on 16th February will unfortunately occur about sunrise at Brisbane, but may be observable at Oontoo, Birdsville, and other places in the far south-west.

The planet Jupiter will be coming into view before midnight in February and March; Venus will pass from west to east of the sun on 9th February; and Mercury from east to west on the 14th. Before the end of March Jupiter and Saturn will be prominent evening stars.

On 21st March the sun will rise almost exactly due east, and set due west, passing from south to north of the equator.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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PART 2.

PRINCIPLES OF STOCKFEEDING.—II.

HOW THE ANIMAL USES ITS FEED.

By CUTHBERT POTTS, B.A., Principal, Queensland Agricultural College.

[In the first article of this series, published in the December issue of the Journal, Mr. Potts described the constituents of stock feed and some of the fruits of the experience, ripened by the simple process of trial and error, of stock-raisers in older countries. In this and succeeding articles it is not proposed to go deeply into the science of feeding, but, rather, to employ the results of scientific research in an effort to show how stockfeeding may be made more profitable.]

Having briefly examined the composition of feeds, and having indicated the special part played by each class of food-ingredient, it is necessary next to study somewhat in detail the uses to which an animal puts its food.

Perhaps we can arrive at a quicker and better understanding of this matter if, first, we put it down in table form and then proceed to describe each item of the table, thus:—

THE FOOD EATEN BY AN ANIMAL IS USED

(1) For maintaining life.	(2) For carrying out the process of digestion.	(3) For production.
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Perhaps in actual practice there is no very clear line of division between these three sections. They overlap somewhat, and, generally, any feed eaten is used in the three ways. Still, the division is convenient. It is real, and a clear conception of each of these three uses for the feed is a sound foundation upon which to build up a proper system of profitable stockfeeding. Let us consider each section in detail.

(1.) *For Maintaining Life.*—If we consider a fully grown animal, say a bullock, and endeavour to keep him just as he is, in good, healthy condition, but neither gaining nor losing weight, nor doing any work, but just living, we would find it necessary to give him each day a certain amount of feed, taking into consideration both quantity and quality (*see Principles of Stockfeeding—I.*). This daily feed would be consumed, but the animal would show no response to it. He would be to-morrow just as he is to-day, or was yesterday. Without this feed he would waste away and eventually die. With this feed he is maintained as he is. Hence we know this as a “maintenance diet.” If less than the maintenance diet is fed, the animal is on starvation rations and must of necessity fall away in condition. If more than the maintenance diet is fed, the animal can produce, as will be described later.

Just here there are several points which are of importance to note. First, we have the case of the young stock. From the very nature of things, young stock try to grow. To feed them a mere "maintenance diet" is not possible. Whatever feed they get, they try to convert some of it into increased body tissue and bone. If the feed is not sufficient in quantity and quality for both maintenance and growth, then neither function is carried out properly. In brief, the young animal becomes starved and stunted. If the shortage of feed is prolonged, the youngster gets a set-back from which it never recovers, while if too prolonged the youngster dies; and we know that young animals will die under conditions of feed which will keep mature animals alive and healthy.

Much the same can be said with regard to cows in milk. Here we have a female endeavouring to produce food for her young. Because of man's careful selection and breeding, however, the dairy cow can produce, and tries to produce, much more milk than is just sufficient to nourish her calf. Here, again, it is not possible to feed a mere maintenance diet. For, whatever feed is given to a cow in milk, some portion of it will be used to make milk, and the better the cow the greater the tendency for her to so use her feed. On a maintenance diet which would keep a bullock in idleness and in good condition, a milking cow would starve to death. How often we see good milch cows lean in condition! They may put on fat when nearly dried off. Further, under drought conditions the best cows are likely to die first.

There is yet a third point which might be mentioned here, though we shall have more to say about it later on. A maintenance diet merely keeps stock as they are. We naturally may ask the question: "Is it profitable to feed a mere maintenance diet?" Let us examine several cases. You might have a number of prime bullocks fit just at a time when the market temporarily is against you. Here it might well pay to feed a maintenance diet, merely for the purpose of holding the bullocks as they are. On the other hand, if you have stock which you have let get into low condition, say, because of drought, and then you begin to feed a maintenance diet in order to keep them alive, it certainly does not pay directly, though it may pay indirectly by holding your stock against the chance of favourable seasons. A little thought, however, will indicate that you may easily expend on feed for such impoverished stock an amount well in excess of their value, and at the end have the stock in the same starved condition as when you began.

With young stock and cows in milk, as has been pointed out, the feeding of a mere maintenance diet does not pay. In truth, with milch cows, the heavier the feeding, within the powers of the cow to produce, the cheaper the feeding. To put it crudely: Suppose it takes 15 lb. of feed for maintenance and each extra pound of feed will enable the cow to produce 3 lb. of milk, then we have the following:—

15 lb. of feed	..	animal kept alive and healthy; no milk
16 lb. of feed	..	animal kept alive and healthy; 3 lb. milk
17 lb. of feed	..	animal kept alive and healthy; 6 lb. milk
18 lb. of feed	..	animal kept alive and healthy; 9 lb. milk
25 lb. of feed	..	animal kept alive and healthy; 30 lb. milk

and it is quite within reason to anticipate that the 30 lb. of milk would more than pay for the 25 lb. of feed given; whereas, with no milk, the 15 lb. of feed is a dead loss.

Thus we see that in this matter of stockfeeding we must consider a portion of the food as being used merely to maintain life. Any feed in excess of this can be used for production. Again, it is quite just to consider the maintenance diet as giving no returns—as being a loss; while any excess feed, because it enables the animal to produce something, does give returns, and possibly profitable returns. In this we have something very similar to the efficiency of a machine. All the energy put into a machine does not come out as useful work. Part of the energy put in is used up in overcoming friction, and is generally referred to as lost energy. We have some considerable control over the amount of energy which may be lost in a machine. By careless oiling, bad adjustments, &c., we can easily increase the loss greatly, but with the greatest of care we cannot reduce the loss below a fairly definite quantity (about 40 per cent.). Is it the same with stockfeeding? Can we exercise any control over the amount of feed required for maintenance? Let us see.

We all know that animals maintain their bodies at some fairly definite temperature; for example, it is 98.4 deg. F. in the case of human beings, 101 deg. F. for cattle, 100 deg. F. for horses, 103 deg. F. for pigs, 107 deg. F. for poultry, &c. To maintain this temperature the animal has to generate an amount of heat inside its body. It does this by oxidising (burning) a portion of its feed as this is being conveyed throughout the body in the blood stream. This generation of body-heat is a normal function of animal life. A portion of the feed must be used for this purpose. Heat is generated and given off by the animal, whether the outside temperature is higher or lower than that of its body. But (and herein lies the important

point for us at this stage of our discussion) more heat, and therefore more of the feed, is required to keep up the body temperature if the stock are exposed to cold, wet, bleak conditions than is the case if they are well housed, or rugged, or well sheltered by trees, say, in the paddocks.

Again, animals are creatures of movement. They move themselves from place to place in search of food and water. They move their jaws in the process of feeding. They swish a tail or shake their skins to rid themselves of flies or other pests. They flicker an eyelid. In short, movement, whether deliberate or involuntary, is a normal state with animals. If they are "at rest," that is, not doing work, then these movements are for maintaining life. But as movement cannot take place without energy to force it, and as the energy in an animal is derived from its feed, so a certain amount of the feed eaten is utilised for the generation of the energy required for what might be called "maintenance movements." Obviously man can have a large control over much of this maintenance movement. If the stock have easy access to both feed and water, so that long travel from one to the other is avoided, movement in search of food can be reduced. In the same way, if the animals are kept under comfortable conditions—conditions which do not cause the beast to wander round aimlessly all night in search of shelter or all day in search of shade, or conditions which largely prevent the irritation by flies or mosquitoes or ticks or other irritants (there is a lot of truth in the phrase "to be worried to death," or, at any rate, to leanness)—then much energy, and consequently much maintenance feed, is saved. It must be remembered, however, that a certain amount of exercise is necessary for healthy life and development. Even when topping up a pig, exercise must not be prevented entirely.

There is yet a third demand for maintenance. We often say that a young animal grows; that it ceases to grow when mature; and that it declines or wastes away with age. This statement is not correct. Growth is a normal function of life, and continues until death. So is the wastage or decline. In young animals the tendency to grow exceeds the tendency to waste; so the animal increases in size and bulk. At maturity, growth and wastage balance one another as regards the actual animal body, though the animal can produce and the energy required for this production can be made good by extra feed. In old age, wastage exceeds the tendency to grow, and so there is a decline. Now this ever-present wastage—wastage of tissue, we term it—requires to be made good. It is a matter of maintenance, and a certain quantity, chiefly of protein matter, is required in the maintenance diet. We cannot exercise any great control over the amount of proteins required to repair the wastage necessary for maintenance.

Thus we see that an animal which is merely living, but neither working nor producing, required an amount of feed for maintenance which will supply:

- (1.) Heat, to keep up body temperature;
- (2.) Energy, to allow of necessary muscular action;
- (3.) Proteins, to repair wastage of tissue.

Careful management can exercise considerable control over the first two, but not much over the third. Carbohydrates, fibre, and fats are chiefly concerned in supplying heat and energy, while the proteins of the feed (Stockfeeding—I.) are mainly responsible for repair of tissue. The discussion as to actual quantities must be deferred to a later article.

(2.) *For Carrying Out the Process of Digestion.*—Referring to our table at the commencement of this article, it will be seen that we have spent considerable space on the discussion of the "maintenance diet." This has been done because it is considered essential that a clear conception of what is meant by maintenance should be got before any idea of profitable feeding—that is, feeding for production—can be established. However, before we approach the production side of feeding, with its probability of profits, it is necessary to consider a subsection—namely, the feed required for the process of digestion.

In this discussion it is not necessary to go into the question of digestion in detail. All that is required is that you should understand one or two points. First.—A certain amount of muscular action is required to break the feed up into small particles and to pass it through the system. Second.—The feed, as it passes into the mouth, and thence to the stomach and on through the intestines, is flooded with various digestive juices. Just consider food as it goes into the mouth. It is chewed, ground up by the teeth, and at the same time it is wetted with saliva. A somewhat similar action takes place at each stage of the food's passage through the animal's system—that is, a certain amount of the feed has to be expended to generate the energy and create the gastric juices required for digestion. Here, again, we have a loss in feed-value. But it is a loss which cannot be eliminated. It can, however, be reduced to a minimum with careful management.

Thus, feeds which contain a large amount of indigestible fibre require more energy for digestion than feeds which are more highly concentrated. For example, hard, dry straw makes a bigger demand for digestive energy than bran, or grain, or green lucerne.

Again, an animal wastes much digestive energy if it becomes over-tired or exhausted. An animal suffering from fatigue does not assimilate its food easily.

But, perhaps, the main point to be considered with regard to this use of the feed is that of "vitamines." This introduces a new feature into our discussion. It can be treated only very briefly here. The term "vitamine" has been applied to certain chemical compounds which are present to greater or less extent in various feeds, but, even so, are present in very small quantities. The function of these vitamins is to make the feed ingredients more readily digestible. In practical feeding we can meet this requirement by using mixed feeds. Thus we find that a feed composed of a single crop—*e.g.*, a feed made up of maize silage, maize stover, and maize meal—is not so satisfactory as one composed of maize silage, oaten chaff, bran, and linseed meal, even though the analysis shows each feed mixture to contain the same quantities of digestible ingredients. In short, by mixing different crop products we are almost certain to bring in the necessary vitamins.

(3.) *For Production.*—This is the third use to which the animal puts its food. It is the important use as regards possible profits. Let us first summarise the different types of production:—

- (a) An animal may be required to produce mechanical energy—*i.e.*, it is used for draught purposes or riding.
- (b) An animal may be required to produce, merely by putting on fat, as when we are topping-up a pig for market.
- (c) Another form of production is that of growth. This may be growth of body tissue, as with young animals, or it may be growth of wool. Included with this might be the production of milk.
- (d) Still another form of production is the reproduction of the race. It is obvious that the female, when carrying the fœtus in the womb, is producing something. It is not so obvious, but it is nevertheless true, that the male is expending much energy when used at the stud.

All these various forms of production require a modification of the feed given, but all of them require feed in excess of the maintenance diet. This will be treated later.

Let me just finish this article by pointing out to you that the feed required for maintenance is a fairly constant quantity—that is, for any given breed or species, equal live weights require the same amount of feed (quantity and quality) to maintain themselves. If feed in excess of this is given, the animal can produce, but individual animals vary greatly in their power to produce. Some are efficient, and pay to feed. Others are inefficient, and are not payable.

Perhaps we can illustrate this best by considering a number of dairy cows. Suppose each cow weighed 1,000 lb. live weight, but that different cows varied in their power of milk production from 20 lb. per day up to 80 lb. per day. Further, suppose each beast fed to the limit of its production. To begin with, each cow would be debited with an equal amount for maintenance. Beyond this, each animal would have to be debited with its production feed. The least consideration (*see table, p. 60*) will show that the worst cow, the producer of 20 lb. of milk, has no chance to pick up her debit for maintenance. On the other hand, the best animal, the producer of 80 lb. of milk, may—in fact, will—pay to feed.

This leaves us, then, with one of the big fundamental facts of feeding: *It does not pay to feed indifferent producers. It does pay to feed high-class stock.*

DAIRY FODDER PLOTS.

By C. S. CLYDESDALE, Assistant Instructor in Agriculture.

The majority of farmers engaged in dairying do not appear to realise the advantages to be gained by the growing of crops to supplement pastures to tide their stock over the leaner months of the year.

With the object of introducing the system throughout the Northern, Central, and Southern coastal districts, where reliance is usually placed on Paspalum, Rhodes, and other grasses, certain crop trials were instituted by the Department of Agriculture and Stock to determine the best single crops or crop mixtures for the purpose, and to demonstrate also that the methods, as practised, are not out of reach or too elaborate for the dairy farmer to undertake.

In Southern Queensland the undermentioned farmers co-operated in carrying out trials with Dairy Fodder Plots during the past season:—A. Hulse, Yandina, North Coast line; F. C. Burton, Bridges, North Coast line; and J. B. Stephens, Nindooimban Estate, Beaudesert.

The soil on Mr. Hulse's farm is a deep, alluvial type of dark-grey loam, fairly rich in humus, which has been under crop, principally maize, for several years. That on Mr. Burton's farm is a deep, light-red coloured, sandy loam, which has been under sugar-cane for a number of years, and, consequently, somewhat deficient in available plant food. Mr. Stephens's property is composed of rich, black, alluvial soil, situated on the banks of the Albert River, and is practically new ground, having produced only two crops, subsequent to which it was fallowed during the Summer months.

No fertilisers were used on this occasion on any of the plots.

The rainfall recorded at Yandina Railway Station, which is $\frac{3}{4}$ mile from Mr. Hulse's, and 3 miles from Mr. Burton's property, was—

Month.	Points.	No. of Wet Days.
March	1,059	9
April	1,110	10
May	357	5
June	716	11
July	643	6
August	183	1
September	172	5

The rainfall for Beaudesert was—

Month.	Points.	No. of Wet Days.
March	487	13
April	453	13
May	213	11
June	792	9
July	652	6
August	31	2
September	205	12

Cultivation.—At Yandina the land occupied by plots was ploughed late in February, to a depth of 8 in., immediately after the removal of a crop of maize (grain), but turned up in a very rough condition; and, later on, in March was cross-ploughed and, prior to planting, was reduced to a fine tilth by means of the disc-cultivator, followed by the harrows.

At Bridges the land was ploughed and harrowed in March, and cross-ploughed and harrowed in May; these operations resulted in an excellent seed-bed.

The plot at Nindooimbah was fallowed during the Summer, and before planting was again ploughed, thus making a perfect seed-bed.

Sowing.—The heavy rain experienced in March and April delayed planting operations. The soil was not dry enough to plant until 16th May, which, under the circumstances, was rather too late to expect early supplies of Winter fodder.

At all plots the usual local practice of broadcast sowing was followed, seed drills being unavailable. When used in mixtures, peas and vetches were sown first and "disced" in, the cereals being sown on the disced surface—once harrowed, and then rolled.

The majority of the plots made rapid progress, particularly the early maturing varieties.

Description and Varieties on North Coast.—The two varieties of wheat experimented with—"Prince" and "Patriot"—appear to be suitable for the coastal districts, being practically free from rust, and made excellent growth. When harvested, they averaged 5 ft. in height.

Ruakura and Algerian oats suffered considerable damage owing to excessively wet weather, causing them to lodge, and to be badly affected by rust. They reached a height of 3 ft. at time of harvesting.

Skinless barley suffered badly from the effects of rust, which appeared when the crops were 2 ft. high, in the "shot blade" stage.

Cape barley did fairly well, and when harvested averaged 4 ft. in height, producing a large amount of foliage, and showing only slight indications of rust.

Rye made quick growth, looked remarkably well throughout the growing season, and, when harvested, averaged 5 ft. in height.

In all plots the field peas did remarkably well, making vigorous growth throughout, and, when harvested, averaged 4 ft. 6 in. in height.

Vetches, which are usually rather slow in growth, produced a fair amount of foliage, and, when harvested, averaged 4 ft. in height.



PLATE 20.—PRINCE WHEAT AND VETCHES AT MR. A. HULSE'S FARM, YANDINA.



PLATE 21.—PRINCE WHEAT AND VETCHES AT MR. F. E. BURTON'S FARM,
BRIDGES, N. C. LINE.

Plots at Nindooimbah.—Throughout the plots, peas and vetches were considerably overgrown by the other cereals used, thus affecting the subsequent yields of fodder. The varieties of wheat—"Prince" and "Patriot"—made excellent growth, stooling well, and having but slight indications of rust. Although they were knocked about considerably by wind and rain prior to harvesting, they did not suffer any serious damage.

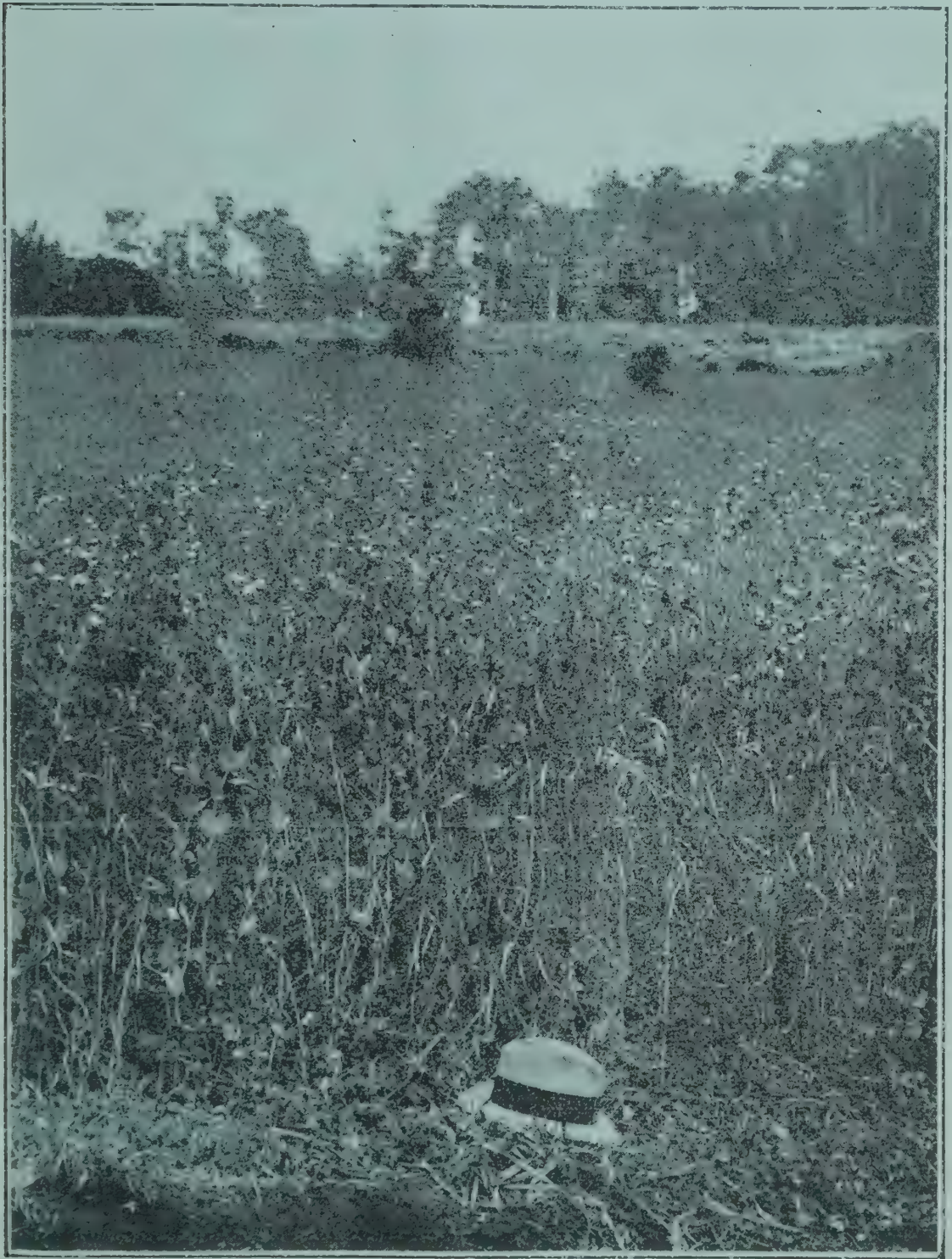


PLATE 22.—PATRIOT WHEAT AND FIELD PEAS AT MR. F. E. BURTON'S FARM
BRIDGES, N. C. LINE.

Skinless and Cape Barley.—During the early stages of growth, these varieties suffered damage from excessive rains, which caused them to lodge; opportunity was taken to make a first cutting, this being effected ten weeks from the date when the young plants first appeared above the ground. A subsequent cutting was made at a later date, details of which appear in tabulated form. Cape Barley made most remarkable growth, but that of "skinless," subsequent to the first cutting, was somewhat thin.

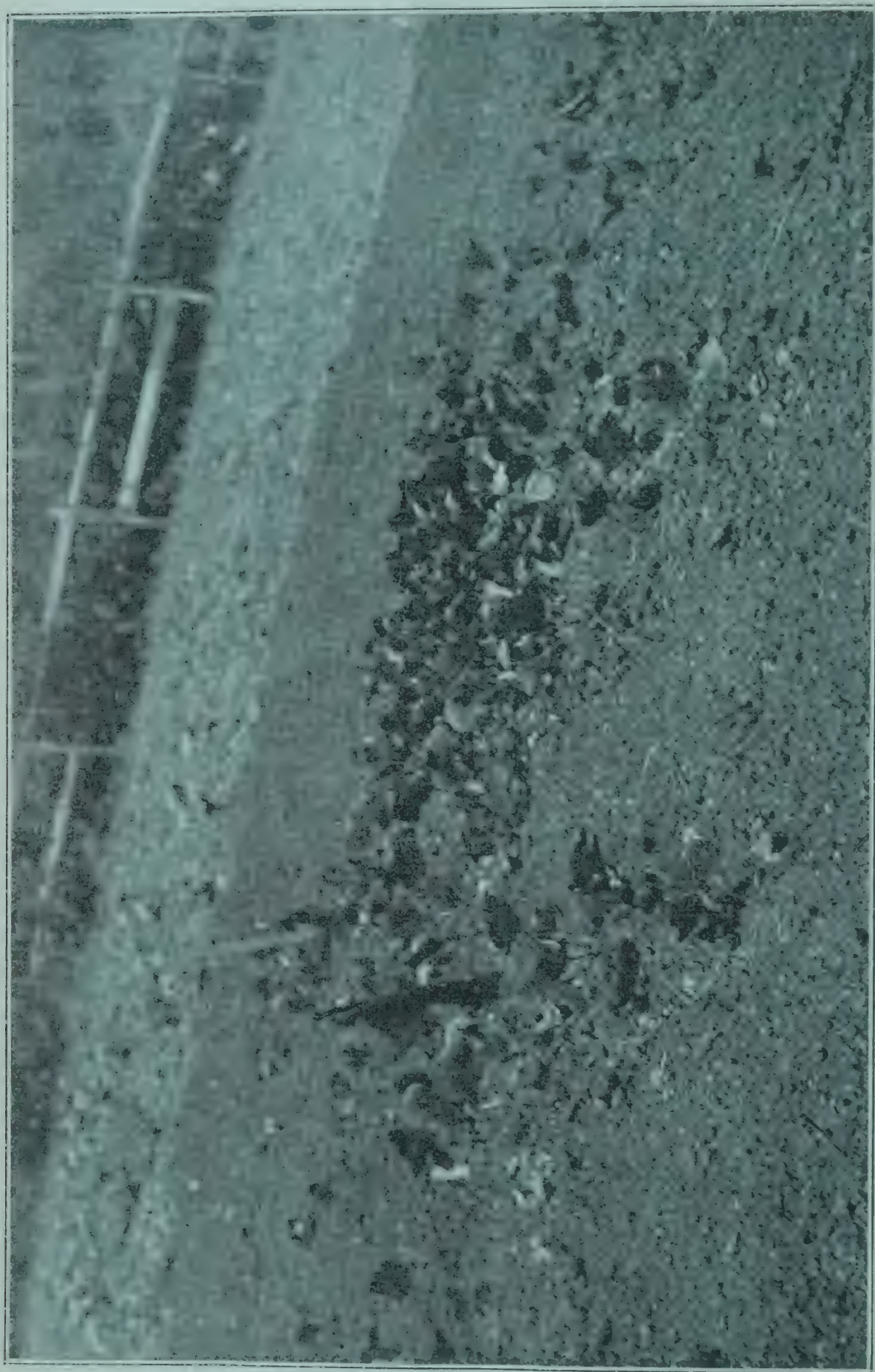


PLATE 23.—KUDZU VINE (FODDER PLANT), AT MR. H. M. McMARTIN'S FARM, PULLEN VALE.

Ruakura and Algerian Oats.—The former, being much the earlier of the two varieties, stooled well, and resulted in a much heavier growth. Later on, however, it showed an inclination to lodge, and to rust. The Algerian oats were somewhat later in maturing, but stooled well; this crop also showed an inclination to lodge, and a susceptibility to rust.

Rye.—Owing to its early maturing habits and favourable conditions, the rye made rapid growth, and was harvested on 13th August, averaging 5 ft. in height at the time.

By using a little judgment in selecting the right varieties to grow, and getting the first sowing in, say, towards the end of March or April, a plentiful supply of green fodder should be available from early August until practically the end of October, by which time the Spring growth in pastures should be well advanced.

In all plots, each of which contained one-tenth of an acre—

- Wheat was sown at the rate of 60 lb. per acre.
- Barley was sown at the rate of 50 lb. per acre.
- Oats was sown at the rate of 40 lb. per acre.
- Rye was sown at the rate of 60 lb. per acre.
- Field peas was sown at the rate of 30 lb. per acre.
- Vetches was sown at the rate of 20 lb. per acre.

RESULTS.

Varieties.	YIELDS PER ACRE OF GREEN FODDER.											
	A. Hulse, Yandina.				F. G. Burton, Bridges.				J. B. Stephens, Nindooimbah.			
	T.	C.	Q.	LB.	T.	C.	Q.	LB.	T.	C.	Q.	LB.
Prince wheat and peas	16	16	2	12	2	14	0	2	13	10	0	10
Prince wheat and vetches	10	16	0	8	6	1	2	4	11	17	2	20
Patriot wheat and peas	16	4	0	12	9	2	0	0	14	0	3	16
Patriot wheat and vetches	11	6	3	4	2	0	2	1	12	18	1	26
Rye and peas	10	16	0	8	5	5	1	9	14	11	2	22
Rye and vetches	7	11	1	0	Destroyed by wallabies				16	4	0	22
Cape barley and peas	12	3	0	9	10	16	0	8	13	10	0	10
Cape barley and vetches	7	11	1	0	2	19	1	19	(two cuttings)			
Skinless barley and peas	11	6	3	14	Destroyed by wallabies				15	2	2	0
Skinless barley and vetches	5	13	1	21	Destroyed by wallabies				5	18	3	10
Ruakura oats and peas	9	9	0	7	Destroyed by wallabies				5	2	2	15
Ruakura oats and vetches	7	11	1	0	4	3	2	25	18	18	0	14
Algerian oats and peas	8	18	1	1	Destroyed by wallabies				17	16	2	2
Algerian oats and vetches	6	15	0	5	3	6	0	19	9	3	2	18
					Destroyed by wallabies				9	14	1	24

The yields generally on Mr. F. G. Burton's plots were reduced by the depredations of wallabies.

RUSSELL RIVER GRASS.

C.W.L.B. (Atherton) writes:—

“*Re* an article in December issue on Russell River Grass. When I was on a farm up here (Atherton) I had a lot of it on my place, and used to curse it pretty heartily on account of the speed with which it covered the ground. It is a fairly useful feed, especially as a change of diet, just after a grass fire while it is young and sweet, but it soon becomes frightfully coarse, almost like a sort of cane (on a very small scale, that is), and stock will not look at it. I think, however, that it will repay careful examination, for this reason:—I had a mob of poor horses in a paddock of it, and the beggars never seemed to be feeding, yet they were putting on condition. So I put in a Sunday watching them. They did not touch the “flag” at all, but put in the whole time painfully nipping off the full-grown seed-heads. As they soon got rolling fat, I judge that these seeds, which are small and round, something like rape, should contain some oil of a high food value. As the grass is a very prolific seed bearer, something might be done in the way of preserving the seed and feeding it in a balanced ration. One never knows. Another thing: the grass will never become a permanent pest in ploughable land, as one turning over settles it.”

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

POINCIANA REGIA.

NATURAL ORDER LEGUMINOSÆ (Pulse or Pea family).

By E. W. BICK, Curator, Brisbane Botanic Gardens.

Derivation.—(B.M.T. 2884, 1841) *Poinciana* (in honour of H. de Poinci, Governor of the Antilles in the middle of the seventeenth century, and a patron of Botany); *regia*, royal, Royal Peacock Flower. This magnificent tree was discovered near Foule Point, Madagascar, by M. Bojer, Professor of Botany at the Royal College of St. Louis, Mauritius, who in the course of a visit to Madagascar discovered and named both *Poinciana regia* and *Colvillea racemosa*.

Description.—A beautiful tree from 30 to 40 ft. high, having an erect trunk covered with a grey, smooth bark; branches spreading, somewhat pendulous at ends, particularly with new growth (this latter including stems); are bright green, the whole forming a beautiful symmetrical head.

Leaves.—Broadly ovate in contour, up to 2 ft. long, abruptly bipinnate, with from 11 to 24 pairs of pinnæ, that are from 2 to 5 in. long; leaflets oblong, blunt at each extremity, upon very short petioles, paler beneath, and one-nerved, in from 16 to 30 pairs about $\frac{1}{4}$ in. long. Common petiole (stem) grooved above, inserted upon a remarkably swollen fleshy base. The new leaves are of a very delicate bright green, darkening with age to a deeper tint. Stipules abruptly bipinnated, erect, not unlike small false leaves; they are deciduous, and only appear on the new growth.

Flowers.—Bright scarlet, in loose racemes, terminal, and from the axils of the upper leaves; petals five, almost orbicular, spreading, reflexed, tapering into long claws, veined on the upper side, and dashed with faint yellow lines above the base; upper petal more cuneate, crinkled at edge, variegated, and striated with red and yellow. Stamens ten, shorter than the petals, filaments red, anthers oblong, two-celled, style terminated by an obtuse stigma, green at base, about the same length as stamens, the complete flower when fully opened being about 5 in. across.

Pod.—Two-valved, of a rather woody texture, from 10 to 24 in. in length, 2 to 2½ in. broad, terminated by the persistent style. Seeds about $\frac{3}{4}$ in. in length, compressed, ash coloured, streaked with brown, and a very hard outer skin.

Propagation.—From seed. When sown fresh they germinate freely, notwithstanding the hard outer covering. It is a good plan to sow in well-drained boxes, covering the seeds with about an inch of sand; keep well watered and out in the full sunshine. The heat helps to germinate the seed quickly. It does not thrive really well in pots after the first season. The young plants are apt to become stunted, but if grown in the open ground a rapid growth can be looked for; being deciduous, they transplant well at end of winter. Old trees flower very well; it usually takes about ten years in the Brisbane district before they commence to produce flowers. Trees that flower well and produce a large crop of seed pods do not, as a rule, flower well the following season, but those that flower and do not seed bear a profusion of flowers each season.

This magnificent tree is widely cultivated throughout the tropical world, its gorgeous flowers making it a universal favourite. In India it is known as the "Flame of the Woods." In the Hawaiian Islands, where it has been largely planted, J. F. Rock, in his "Leguminous Plants of Hawaii," alludes to its strong root system, saying "not even the severest storms these islands experienced in December, 1918, uprooted a single tree of this species." In many places it is known as the "Flamboyant."

In Brisbane the *Poinciana regia* flowers in December and January. There are four fine specimens, and a number of newly planted ones, in the Botanic Gardens. A particularly fine tree that always flowers profusely is growing at Bowen Park, a smaller but a very fine specimen in the Museum Gardens, and numerous others in many private gardens, but room should be found for many more of this, probably the best of all flowering trees.

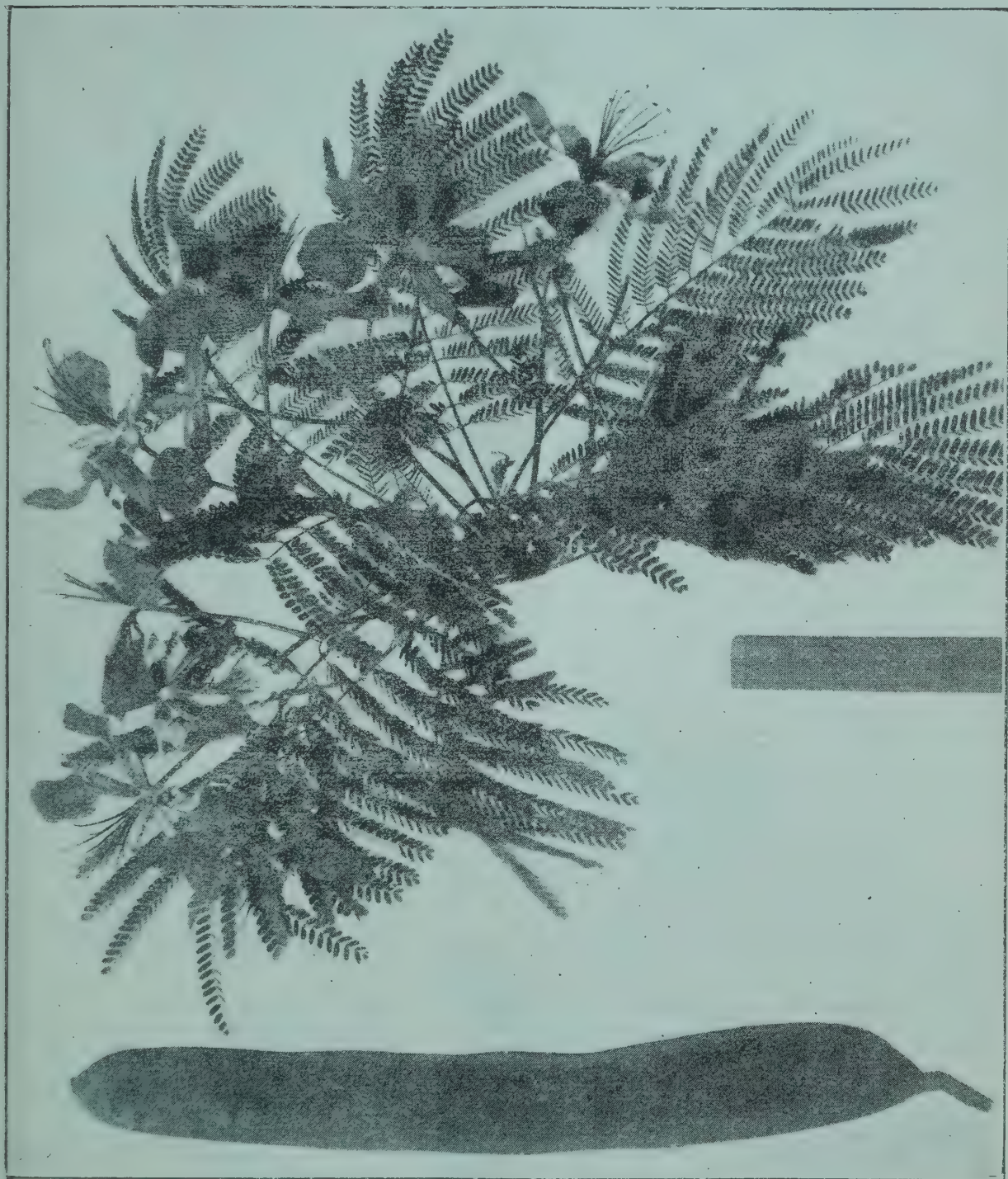


PLATE 24.—POINCIANA REGIA.

A.—Seed pod.

B.—Flower stem.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 26.

WILD SALVIA (*Salvia coccinea*).

Description.—A strong-smelling undershrub of 2 to 3 ft. Stems quadrangular, downy, often with a purplish tinge. Leaves ovate or triangular ovate, 1 to 2 in. long, on a petiole (leaf-stalk) of 1 to 1½ in.; under-surface slightly wrinkled and clothed with white hairs; the edges toothed with rounded teeth. Flowers scarlet (rarely pink or pure white), borne in whorls along a slender spike, each whorl of flowers subtended by two green bracts; each individual flower is on a pedicel (stalklet) of about ¼ in. Calyx dark-green or tinged with purple, prominently ribbed, about 5 lines long. Nutlets ("seeds") light brown, ellipsoid, about 1 line long, situated at the bottom of the calyx tube.

Distribution.—A native of the warmer parts of North and South America; naturalised in most of the subtropical or warmer parts of the globe.

Botanical Name.—*Salvia*, from Latin *salvo*, I save, on account of the use of several species of the genus as healing and curative herbs; *coccinea*, Latin, of a scarlet colour.

Common Name.—Commonly known as "Wild Salvia" on account of its similarity on a small scale to the common garden plant *Salvia splendens*.

Properties.—This plant has been introduced into most warm countries as a garden plant. So far as I know, it does not possess any economic value.

Some years ago it was reported from the Beenleigh district, south-eastern Queensland, as a weed believed to be causing abortion in cows. I had not further heard of the matter until Mr. W. Greenwood, of Lautoka, Fiji, supplied me with the following note:—"In the Proceedings of the Hawaiian Entomological Society, in Vol. I., page 1179, the following account of the plant occurs under a description of a trip to one of the smaller Hawaiian Islands: 'At about 1,500 ft. elevation the introduced red-flowered salvia (*S. coccinea*) was growing wild; this was probably an escape from gardens, and which, if not eradicated, will become a pest (if it is not one already), as it is known to produce abortion in cattle.' " Mr. Greenwood goes on to say that the plant is a common weed in parts of Fiji, but he has heard of no harmful properties being attributed to it by cattlemen there.

The reports, however, of the plants causing abortion in cattle from two widely separated sources is remarkable. An allied plant *Mentha satureoides* (the "native pennyroyal"), a common weed in Queensland, was recently brought to me as being illegally used as an abortifacient, and the use of the common pennyroyal (*Mentha pulegium*) in this capacity is well known.

Eradication.—So far as observed in Queensland, the "wild salvia" is not a particularly aggressive weed, and calls for no special method of eradication.

Botanical reference.—*Salvia coccinea* Juss. ex. Murr. in Comm. Gotting. I. (1778), 86, tab. I.

THE DAIRY PRODUCE ACT.

Vendors of butter, cheese, and condensed milk are now directed to register under "The Dairy Produce Act of 1920." Forms of application may be obtained from the local dairy inspector or the nearest clerk of petty sessions, and the application for registration, together with the prescribed fee of 2s. 6d., should be posted direct to the Department of Agriculture and Stock, Brisbane. Owners of cream depôts, butter, cheese, and condensed milk factories, butter and milk carts, farm produce agents, and vendors of fertilizers and margarine are reminded that they must immediately register licenses for the year 1922 with the Department of Agriculture and Stock.



PLATE 25.—WILD SALVIA (*Salvia coccinea*).

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 8.

OPOSSUM WOOD (*Quintinia Sieberi*).

Common Name.—Opossum Wood (may originate from the peculiar wrinkles of the bark, which might have been attributed by bushmen to the scars left by the claws of opossums; the peculiar markings of the bark, which are a natural feature of it, resemble the scars left by opossums' claws).

Derivation.—*Quintinia*, in memory of La Quintinie, a French botanist; *Sieberi*, after F. W. Sieber, a botanical collector, of Prague, Bohemia, who spent seven months in collecting plants in New South Wales in 1823 (J. H. Maiden).

Description.—A tree attaining a height of 70 ft. and a barrel diameter of 2 ft. Barrel not prominently flanged at base. Bark dark brown, sometimes almost black, often wrinkled and with a row of scales on each side of the wrinkles; when cut, light brown, white near sapwood; measurement of bark, $\frac{3}{8}$ in. thick on a tree with a barrel diameter of 1 ft. 9 in. Sapwood white. Branchlets, leaves, and inflorescence hairless. Leaf stalks, $\frac{3}{8}$ to $\frac{3}{4}$ in. long. Leaves alternate, egg-shaped or elliptical in outline, mostly protracted into a short blunt point at the apex, lateral nerves and net veins visible on both surfaces; measurement of leaf blade 3 to 4 in. long, two to three times as long as broad. Flowers in bunches (panicles consisting of racemes) at the ends of branchlets; the bunches, which are about as long as they are broad, are often about as long as the leaves. Stalklets of flowers about $\frac{1}{16}$ in. long. Flowers about $\frac{1}{4}$ in. diameter when expanded; the lowermost part, the calyx, funnel-shaped, about $\frac{1}{4}$ in. diameter, with five minute triangular lobes at the rim. Above the calyx are the five petals, each over $\frac{1}{8}$ in. long. Alternating with the petals and shorter than them are five stamens. The ovary, in centre of flower, is surmounted by a finely three to five furrowed style nearly $\frac{1}{8}$ in. long. Fruiting capsule nearly $\frac{1}{8}$ in. diameter, three to five celled, with several seeds in each cell, the five persistent calyx teeth forming a rim near the top, and the five styles separating from the base to near the summit and persistent on the capsule at its top. Seeds brown, less than $\frac{1}{16}$ in. long.

Flowering period.—October and November; in fruit in December and January.

Distribution.—Confined to Australia. Common in the scrubs of the higher altitudes of Macpherson Range, National Park, ranges near Killarney, and Mistake Mountains. New South Wales, from near the Victorian border on the south to the Tweed River on the north; common in the scrub of the gorges of the Blue Mountains.

Uses.—Very little appears to be known about the commercial value of the timber.

Remarks.—It is a remarkable fact that this tree generally begins life on the trunks of tree ferns, where the seed germinates and the young trees develop.

References.—*Quintinia Sieberi*, A. de Candolle: Monog. Camp. 90; Bentham: "Flora Australiensis," vol. II., p. 438; F. M. Bailey: "Queensland Flora," Part II., p. 531; J. H. Maiden: "Forest Flora of N.S.W." vol. VI., p. 28, with figure.

LONG-LIVED BRITISH ENGINES.

Many examples have come to light of British engines which have been at work from the very earliest days of steam engineering. The Science Museum in London has recently placed among its exhibits a pumping engine made in the year 1791, by Newcomen. This engine was at work until the year 1915 at a colliery near Derby. Another engine, which was made in the early part of the nineteenth century, has also been presented to the Museum. Both engines are still capable of doing useful work, although they represent pioneer types very different from the British steam engines of to-day.

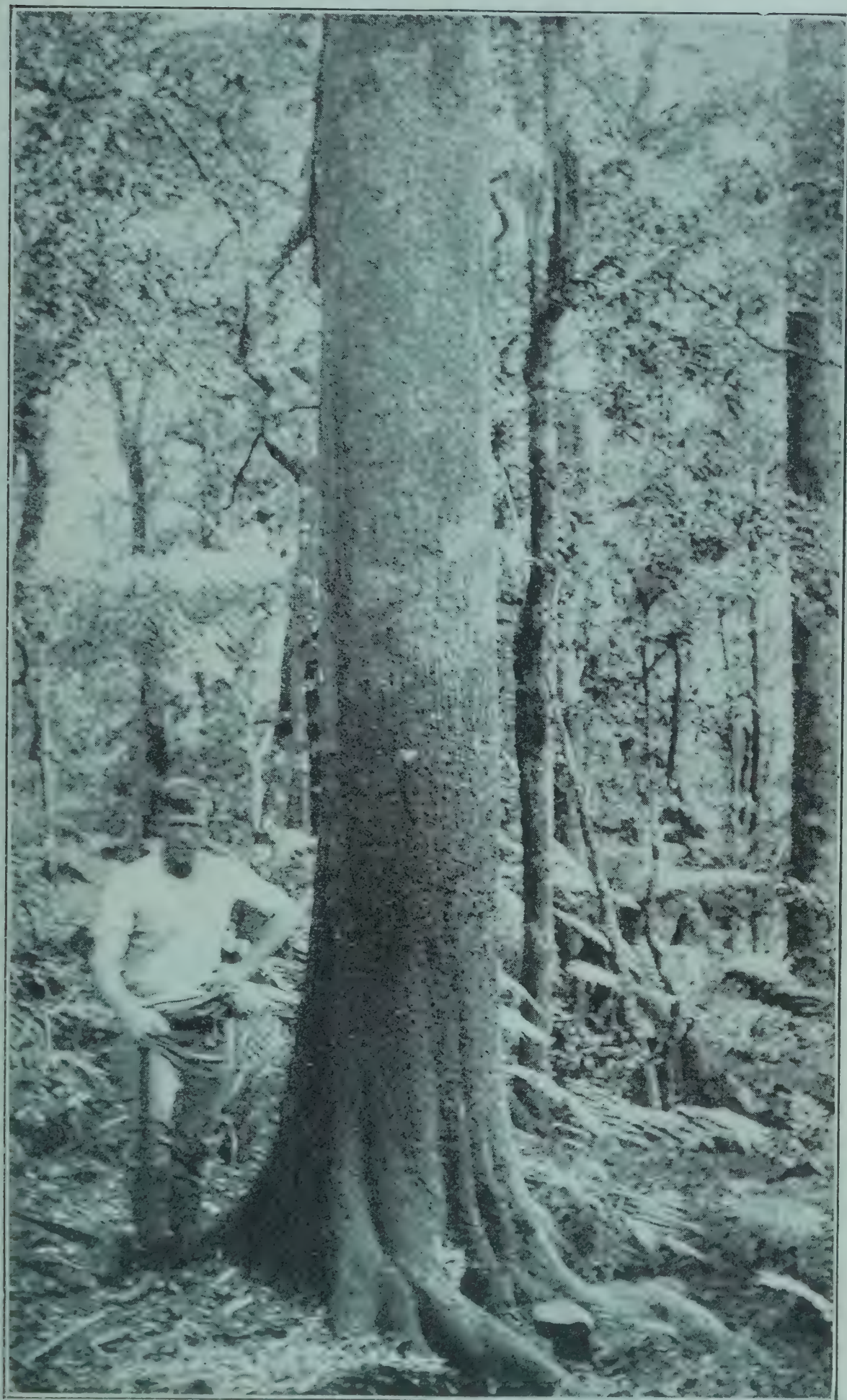


Photo by the Authors.]

PLATE 26.—OPOSSUM WOOD (*Quintinia Sieberi*), Ranges eastward of Emu Vale,
Killarney District.

PLATE 27.—OPOSSUM WOOD (*Quintinia Sieberi*).

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1921.

The weather for the month was very unfavourable for egg-production. The first three weeks were intensely hot, and during the last week 7 in. of rain fell. The outstanding feature of the month's laying was the splendid score of 170 eggs by T. Fanning's pen of White Leghorns. Broodiness has again been troublesome, but not the same extent as in November. There are odd cases of moulting, most of which are birds which have just left the broody coop. The health of the birds has been excellent. Green feed during the early part of the month was very scarce, but the excellent rains should account for a plentiful supply for the rest of the test. The following are the individual scores:—

Competitors.	Breed.	Dec.	Total.
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LIGHT BREEDS.

*J. M. Manson	White Leghorns ...	141	1,195
*W. and G. W. Hindes	Do.	141	1,185
*Mrs. R. Hodges	Do.	145	1,149
R. Gill	Do.	114	1,142
*T. Fanning	Do.	170	1,131
*H. Fraser	Do.	139	1,115
*Geo. Trapp	Do.	108	1,090
F. Birchall	Do.	113	1,068
*C. M. Pickering	Do.	127	1,074
Oakleigh Poultry Farm ..	Do.	119	1,054
H. C. Thomas	Do.	95	1,043
*H. C. Towers	Do.	84	1,034
*W. Becker	Do.	123	1,032
R. C. Cole	Do.	117	1,022
*Thos. Eyre	Do.	136	1,017
*R. C. J. Turner	Do.	137	1,016
W. A. Wilson	Do.	110	1,010
*J. W. Newton	Do.	126	1,010
*Thos. Taylor	Do.	136	1,001
*C. Goos	Do.	93	987
Mrs. E. White	Do.	103	979
*E. Chester	Do.	129	976
*S. L. Grenier	Do.	107	975
M. F. Newberry	Do.	107	970
*E. A. Smith	Do.	117	968
Bathurst Poultry Farm ...	Do.	102	964
*G. W. Williams	Do.	117	959
*Mrs. L. F. Anderson	Do.	117	956
*B. Chester	Do.	117	955
*J. W. Short	Do.	118	954
W. Barron	Do.	98	951
H. Stacey	Do.	93	939
*Haden Poultry Farm ...	Do.	117	921
C. A. Goos	Do.	110	916
*H. P. Clark	Do.	125	908
Mrs. E. Z. Cutcliffe	Do.	92	888
E. Stephenson	Do.	97	870
*W. and G. W. Hindes ...	Brown Leghorns ...	74	841
Linquenda Poultry Farm ...	White Leghorns ...	106	854
W. M. Glover	Do.	96	829
Brampton Poultry Farm ...	Do.	105	822

EGG-LAYING COMPETITION—*continued.*

Competitors.					Breed.	Dec.	Total.
HEAVY BREEDS.							
T. Fanning	...	...	...	...	Black Orpingtons	110	1,190
*R. Burns	...	...	...	...	Do.	138	1,156
*A. E. Walters	...	...	...	...	Do.	120	1,118
*T. Hindley	...	...	...	...	Do.	127	1,118
W. Becker	...	...	...	...	Langshans	127	1,115
*Parisian Poultry Farm	...	...	...	...	Black Orpingtons	130	1,086
*Jas. Ferguson	...	...	...	...	Chinese Langshans	110	1,083
*C. C. Dennis	...	...	...	...	Black Orpingtons	124	1,067
Rev. A. McAllister	...	...	...	...	Do.	77	1,052
Jas. Ryan	...	...	...	...	Rhode Island Reds	108	1,044
Geo. Muir	...	...	...	...	Black Orpingtons	106	1,039
*E. Morris	...	...	...	...	Do.	121	1,036
*E. F. Dennis	...	...	...	...	Do.	119	1,013
Jas. Potter	...	...	...	...	Do.	86	998
Jas. Every	...	...	...	...	Langshans	84	990
*J. Cornwell	...	...	...	...	Black Orpingtons	108	987
*N. A. Singer	...	...	...	...	Do.	128	976
*R. Holmes	...	...	...	...	Do.	98	920
*J. E. Smith	...	...	...	...	Do.	112	916
*A. Shanks	...	...	...	...	Do.	109	910
*E. Stephenson	...	...	...	...	Do.	85	907
*H. C. Chaille	...	...	...	...	Do.	121	900
G. Cummings	...	...	...	...	Do.	87	897
*Mrs. G. Kettle	...	...	...	...	Do.	101	885
*E. Oakes	...	...	...	...	Do.	132	882
J. W. Newton	...	...	...	...	Do.	92	864
F. Harrington	...	...	...	...	Rhode Island Reds	110	816
F. C. Hart	...	...	...	...	Black Orpingtons	106	756
Total	...	...	...	...	...	7,800	68,491

* Indicates that the pen is being single tested.

DETAILS OF SINGLE TEST PENS.

Competitors.				A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.										
J. M. Manson	..	..	..	188	202	220	190	224	171	1,195
W. and G. W. Hindes (W.L.)	..	..	..	209	183	193	213	207	180	1,185
Mrs. R. Hodge	..	..	..	190	194	211	197	202	155	1,149
T. Fanning	..	..	..	205	182	203	176	179	186	1,131
H. Fraser	..	..	..	217	160	195	189	188	166	1,115
Geo. Trapp	..	..	..	195	166	187	175	196	171	1,090
C. M. Pickering	..	..	..	198	181	180	162	195	158	1,074
H. C. Towers	..	..	..	184	160	174	144	168	204	1,034
W. Becker	..	..	..	190	194	162	161	191	134	1,032
Thos. Eyre	..	..	..	179	167	134	181	185	171	1,017
R. C. J. Turner	..	..	..	174	161	166	158	175	182	1,016
J. W. Newton	..	..	..	170	189	195	174	121	161	1,010
Thos. Taylor	..	..	..	167	171	163	142	156	202	1,001
Chris. Goos	..	..	..	175	180	142	124	149	217	987
E. Chester	..	..	..	183	162	152	160	156	163	976
S. L. Grenier	..	..	..	159	189	136	168	165	158	975
E. A. Smith	..	..	..	197	157	175	162	156	121	968
G. Williams	..	..	..	217	174	133	137	154	144	959
Mrs. L. Anderson	..	..	..	167	171	155	152	167	144	956
B. Chester	..	..	..	135	163	186	157	168	146	955
Haden Poultry Farm	..	..	..	106	152	168	169	158	168	921
H. P. Clarke	..	..	..	198	123	158	125	164	140	908
W. and G. W. Hindes (B.L.)	..	..	..	120	145	122	116	138	200	841

DETAILS OF SINGLE TEST PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	141	177	234	179	200	225	1,156
A. E. Walters	211	197	177	184	169	180	1,118
T. Hindley	197	196	200	153	178	194	1,118
Parisian Poultry Farm	193	179	176	234	127	177	1,086
J. Ferguson	175	167	167	208	179	187	1,083
C. C. Dennis	179	163	164	197	185	179	1,067
E. Morris	195	179	127	193	171	171	1,036
E. F. Dennis	159	185	165	159	165	180	1,013
J. Cornwell	157	161	164	181	148	176	987
N. A. Singer	171	149	160	163	144	189	976
E. Stephenson	181	147	156	161	112	150	907
R. Holmes	129	162	161	164	178	126	920
J. E. Smith	197	212	142	114	129	122	916
A. Shanks	124	150	155	162	149	170	910
H. C. Chaille	110	165	157	185	155	128	900
Mrs. G. Kettle	144	174	192	95	132	148	885
E. Oakes	135	153	154	174	131	135	882

CUTHBERT POTTS,
Principal.

CHICKEN POX.

By J. BEARD, Poultry Instructor.

Chicken-pox is due to an ultra-microscopic germ, the nature of which is not known. This disease affects chickens, pigeons, canaries, and turkeys. Geese, ducks, and guinea fowls are immune. Turkeys are very liable to contract it; as for fowls, their resistance generally varies inversely with the age of the bird.

The death rate from the disease among chickens from two to three weeks old is very often 100 per cent., whilst with chickens two to four months old it is sometimes nil. Birds of pure breed are less resistant than their crosses. Minorcas and leghorns are the most susceptible.

The infection can either be mild or severe, depending on the number, size, and seat of the nodules. At times the nodules are not any larger than a sorghum seed, and fall off without any treatment, the infection disappearing in about six weeks without affecting the general health of the birds. In severe cases the nodules are very large in size, inflammation sets in through scratching, and the nodules become tumour-like in appearance. When the eyelids and angle of the mandibles are affected, the beak remains open, the bird being unable to close it. The inflammation soon reaches the mouth, which is covered by a thick false membrane. The birds, being thus blind and unable to pick their food, soon become anaemic and emaciated, and die of starvation or are poisoned by other germs which infect the nodules and the mucus lining of the mouth. This disease prevails all the year round, but is more intense at the-beginning of the summer, the death-rate being heavy from November to February.

It is said that chicken-pox is highly contagious, though the causes of infection have never been clearly defined. It is noticed that the disease prevails in an epizootic state during the dry season, *i.e.*, from November to February, and is more or less sporadic during the other months of the year. It has been said that dust is the medium of infection and that the disease is transmitted from bird to bird. This theory does not hold good, however, when one considers that the disease prevails all the year round, and that it may appear suddenly in localities where it was unknown before. It is evident, therefore, that the infection is carried through some other channel.

From observations made, I am of opinion that the infection is transmitted directly from one bird to another in exceptional cases only, but is more usually conveyed by a vector, which may be the mosquito or any night-biting insects, such as bugs, or sand-flies. To prevent the disease from spreading, the affected birds should be segregated.

Treatment.—Apart from the serum, which has not yet proved of much value, there is no specific remedy known against chicken-pox. The best-known remedies have never given any good results, except in mild cases, which, no doubt, have recovered more quickly without treatment. Cauterisation by means of metallic salts generally increases the inflammation, and should only be used in special cases—for example, when mouth and eyes are to be dressed. My experience has shown that the less one interferes with the sickness the quicker is the recovery. The removal of the crust or scab with a view of obtaining a rapid cure complicates matters, since the sores which are protected by their crust are thus exposed to further infection. It may, however, be necessary at times to apply treatment in order to avoid ophthalmia or to prevent the false membranes from invading the mouth.

The false membranes arise from the nodules existing on the margin of the beak and at the junction of the mandibles. In such cases the crust, which must be previously softened with a lukewarm solution of boric acid, is removed and the sore painted with iodine. The false membrane of the mouth can be detached by means of a swab and the front painted with iodine and glycerine or with some specific containing tannic acid.

During the attack add magnesia to the drinking water, and supply twice a week epsom salts to the morning mash at the rate of one packet to twelve adult fowls. Avoid feeding meat, maize, or any other starch-containing foods in any form.

SUGAR: FIELD REPORTS.

Mr. J. C. Murray, Southern Field Assistant, reports under date 6th January, 1922, as follows:—

In the course of the month of December the districts of Maryborough, Pialba, Yerra, Mount Bauple, and Childers were inspected.

Maryborough.—The crushing season just ended at Maryborough has been a satisfactory one. Good average tonnages were obtained, while, generally, the c.e.s. values were satisfactory. More cane has been planted than has been the case for some years, and the prospects of a good yield next year look bright. The young plant crop is very forward, while ratoons are stooling vigorously.

The farmers on Tinana Creek have considerably developed their holdings this year. Big timber and its clearing are the chief obstacles met with in the initial stages of preparation on Tinana Creek, but in the course of time the farmers hope to make their soil entirely fit for intensive cultivation. Farmers could profitably turn their attention more to adding texture to the soil by the use of vegetable manures, and endeavouring to ascertain, by local experiment, the value of concentrated fertilisers. In practically all cases, stable manures cannot be too highly recommended. Observation of different canes, with a view to obtaining a good early maturing variety, is recommended to growers, as this season many of the canes had to be cut while immature. In this respect H.Q. 285 is a cane which should give satisfactory results.

Pialba.—The growers have had good returns this year. Much of the land is still badly in need of added matter calculated to improve the texture and reduce soil acidity, but, nevertheless, farming is reaching a higher standard. The 1922 crop should be a good one. Plant cane is growing well, while most of the ratoons present a satisfactory appearance. In some places stools are diseased and have refused to ratoon, and it is recommended as a precautionary measure that stools be ploughed out next year and carted off the field. In cases like this there is the probable danger of a gradual infection of healthy cane; therefore it is well to act before this happens.

D. 1135, N.G. 16, M. 187, M. 1900 Seedling, Q. 813, and Rappoe are canes that are now making a good showing. The introduction of larger areas of 1900 Seedling and Queensland 813 would probably give the farmers more satisfactory tonnages than hitherto.

Yerra.—The farmers are still busy clearing new scrub land and farming their already-improved holdings. Their need for good roads is urgent. As the result of having to cut, in some cases, too early, there was considerable loss on some of the Yerra crops, particularly on the D. 1135 and 1900 Seedling. If possible, the latter variety at least should never be cut before the 20th September; otherwise there is a loss, both in c.e.s. and subsequent shy ratooning of the cane.

Among the varieties growing and making favourable progress are M. 16804, E.K. 1, H. 22, Q. 813, Shahjahanpur, H.Q. 77, E.K. 28, H.Q. 77, H. 146, J. 147, N.G. 81, Q. 970, E.K. 2, and H.Q. 285. Most of these have only been recently introduced, but are promising canes, particularly the Q. 813, which the farmers are highly recommended to plant.

Mount Bauple.—Canegrowing is being vigorously carried on. It is quite a fallacy to suppose that this district is unsuited for sugar production. On the contrary, given fair average weather conditions, the farmers here can rely upon getting as high c.e.s. values and tonnages as anywhere south of the tropics. A good deal of attention is being given by the growers to fertilisation. This is an important matter at Mount Bauple, and the growers are recommended to make full use of the facilities provided by the Bureau for obtaining information on this matter.

Good work is being done by Mr. Holloway, head teacher at the school, in connection with encouraging the children to take an interest in cane culture, and with this end in view he has a small plot established, and he hopes later to give some information as to results. Q. 813 is making remarkable growth, and the farmers in the course of time will probably be growing this cane as a staple variety.

Stools in places are affected, and the precautionary measure of ploughing out old stools would be a good one. Liming on old soils would also be very beneficial. Good results have been obtained by filterpress cake on some Bauple soils, but the use of green manures and lime would be cheaper and much more efficient.

Cane pests are, fortunately, not serious just now, and this is due in a measure, especially with regard to the borer, to care in planting and the destruction of cane that might have deteriorated into rubbish in the vicinity of healthy cane.

Childers.—Childers at present presents the appearance of a large and well-tended landscape garden. The farms are marvellously green, and much cultivation has been done by growers. The majority of the farmers are up to date in their equipment. Fertilising on a fairly large scale is now being undertaken. Farmers are strongly advised to be cautious before indiscriminately applying chemical fertiliser. Ample facilities are at hand whereby they can get soil and fertilisers tested, and so save, perhaps, time and money. Advice on all methods of manurial experiment can be obtained from the Bureau.

Regarding cane varieties, 1900 Seedling and D. 1135 appear to be, so far, the best of the staple varieties, although there are some very fine crops of Q. 813 growing. Regarding the two first-mentioned canes, there was considerable loss in c.e.s. value this year through cutting too early, and growers are recommended to plant these canes in conjunction with H.Q. 283, which is a good cropper and an early maturing variety. A small area of H.Q. 285 brought from the Maroochy River is already doing well as a young plant crop. Up the line, at Booyal, the farmers are once again taking up canegrowing seriously. There are some very fine areas showing at present, especially D. 113. As many as forty-eight sticks of plant cane of this variety were counted on one stool. Other canes doing well at Booyal are M. 1900, Striped Singapore, Rappoe. E.K. 28, E.K. 1, J. 247, and Shahjahanpur. The three lastnamed, recently distributed from Bundaberg Experiment Station, are looking very promising. About 2,000 tons of cane were sent from Booyal this season, and by appearances this tonnage should be increased 50 per cent. next season.

There is a great deal of fine sugar land still to be cleared on this Upper Burnett country; in fact, there is sufficient to support another sugar-mill.

Mr. E. H. Osborn, the Northern Field Assistant, reports under date 11th January, 1922, as follows:—

Gordonvale.—Early in the month of December a short visit was paid to this district. Conditions at the time were very dry. The mill was very busily crushing and preparing for extensive alterations and additions necessary to cope with the extra tonnage of cane entailed by the redistribution of areas in connection with next season's crop.

A flying visit was made to the Riverstone area. Mr. George Alley (of Blackwell and Alley) advised in connection with their harvesting that a 5-acre block of river flat Plant Badila had cut at the rate of 37 to 38 tons per acre. As this particular block is probably the oldest cane land in the Mulgrave area, having previously grown cane for the old Pyramid Mill some thirty-five years or so ago, and having been practically under cane ever since, its fertility is remarkable. Lately Mr. Alley has used about 4 cwt. of mixed fertiliser on plant cane, and about half of that quantity of sulphate of ammonia upon ratoons.

Further up the river several new farmers were noticed growing cane on portions of the old Pyramid plantation.

A very large number of greyback beetles was noticed in the weeping figs and other feeding trees in the area, some being even found in the mosquito curtains of the hotel. These were evidently attracted by the gaslight.

Babinda.—Dry weather prevailed in this region until the 11th, when some very welcome showers fell. Milling operations for 1921 had ceased, and the cane harvested amounted to 117,321 tons, equalling a return of 18.1 tons per acre. Of this tonnage, about 90 per cent. was Badila, the remainder being mainly D. 1135 and H.Q. 426. The acreage cut was 6,472, and a further 549 acres were allowed to stand over. Burnt cane, in the proportion of 45 per cent., was cut. Next season some 7,000 acres should be harvested.

During the crushing period no strikes or industrial troubles of any kind caused delay, and the early finishing up will give the growers a good chance to thoroughly work their farms. Early plant and also the earlier-cut ratoons have not made the growth expected in this area. The later-planted cane, and also the ratoons cut later on in the season, are, however, looking pretty well.

Some splendid plant and also ratoon Badila were seen upon Mr. P. Larsen's Bartle Frere holding. Both on his river flat and red soil very fine growth was noticed, and the cane looked remarkably green and healthy.

Around Mopo some very good crops of plant cane were seen. They were all very clean, good coloured, and strong in growth. Very few beetles have been seen so far this year in the Babinda area.

South Johnstone.—This district was revisited during the third week in December. Weather conditions were dry, no rain of any consequence having fallen for about a month. Later, however, after a couple of preliminary showers, heavy falls occurred, making the total for the month to date (28th December) of 18.71 in., 17.96 in. of which fell since the 19th. At time of writing the cane everywhere looks splendidly green and vigorous. After such heat, the growth is naturally forced, and the rich volcanic and alluvial soils respond very readily. On the red soil the cane looks extremely well. Many pony ploughs are being used among the stumps with very good results.

Around the Kalbo country the work of getting the cane from the low-lying alluvial flats up to the branch line leading to the main locomotive line at Kalbo Junction is distinctly arduous, comprising, as it does, the haulage of the cane up a very steep ridge, 12 chains in length, by means of a wire rope attached to a donkey engine supplied by the South Johnstone Central Mill.

CANE PESTS CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (13th January, 1922) from the Entomologist at Gordonvale, Mr. Edmund Jarvis:—

“During the past month the time has been very fully occupied in experimentation affecting the adult form of our ‘grey-back’ cane beetle. Unfortunately, this important phase of its life-cycle occupied only a couple of months—viz., during the flying period—whereas the grub stage admits of investigation during about six months of the year.

“The wet season set in here on the evening of 19th December, and by midday on the 21st 7.18 in. of rain had fallen at Meringa, thus putting a stop, for the time being, to field experiments and fumigation of the soil with carbon bisulphide.

“Experiments with Deterrents.

“Our plots at Carrah were treated between 12th November and 8th December in order to allow for beetles emerging at the beginning of November, and for a second emergence on the 18th of that month. The various insecticidal substances used with a view to inducing beetles to avoid the treated areas were coal-tar, naphthalene, chloride of lime, tobacco dust, and carbolineum emulsion, each plot being one-eighth of an acre and separated by a control plot.

“To avoid labour involved in emulsifying and spraying the tar, it was prepared by mixing the quantity needed—viz., 2 gallons (= 16 gallons per acre)—with five kerosene tins full of sifted soil, so that it could be easily sprinkled, either by hand or machine, on each side of and between the stools of cane, in a strip about 3 ft. wide. When examined twelve days later (0.15 in. of rain having fallen during the interval) the tarry odour was quite pronounced, and even after twenty-six days it was still perceptible, although not sufficiently so to be repellent. The chloride of lime, which was also mixed with soil and applied at the rate of 160 lb. to the acre, maintained its odour for nearly a week, but lost it about nine days after. The naphthalene was administered at the rate of 120 lb. per acre, and retained its repellent properties longer than the lime; while the carbolineum emulsion did not keep its odour beyond a few days. Tobacco dust, applied at the rate of 96 lb., retained its odour for some days after application. It will be interesting to note later on whether any of these repellents have induced egg-laden female beetles to oviposit elsewhere.

“Poisoning the Adult Beetle.

“As mentioned last month, five sets of experiments have been conducted this season, comprising eighty-nine cages containing leaves sprayed with various arsenical solutions.

“The results obtained, although not altogether conclusive, were sufficiently encouraging to warrant further experimentation along similar lines next year. One point of importance observed was the fact that beetles to be experimented with should be captured directly they emerge, and before they start feeding.

“After being four or five days on the trees, they cease feeding and practically eat little or nothing during the remainder of their aerial existence. For instance, out of fifteen beetles collected on 2nd December (nine days after emergence) about 50 per cent. did not live more than a week; and during the course of this experiment only one beetle out of this number touched the fresh figleaves placed in its cage.

“Those used for the first experiment were captured on 5th November, about four days after emerging from the soil, but even then the majority had ceased feeding, as only eight out of the thirty touched the leaves placed in the cages. The first beetles to die were those that had eaten portions of the poisoned leaves.

“Paris green 1 lb., lime $1\frac{1}{2}$ lb., in 8 gall of water, proved fatal from four to seven days after feeding; while arsenate of lead took nine days. About 50 per cent. of these beetles died just a fortnight after capture, the last succumbing after twenty-four days. The beetles that lived longest (from sixteen to twenty-four days) were those that took no food whatever. The specimens that fed were four control beetles, and a similar number from treated cages.

“In an experiment conducted on 22nd November, it was found that confined specimens of *albohirtum* would feed indifferently either on Moreton Bay Ash (*Eucalyptus tessalaris*) or the ‘tar’ tree (*Semecarpus australiensis*) when leaves of both species were placed together in the cages. I have previously mentioned that this cane-beetle does not, like some insects, exhibit a keen sense of discrimination in the choice of food, but, on the contrary, appears indifferent as to its flavour, being as ready to devour leaves sprayed with poisons as untreated foliage.

“Parasite of Moth-Borer.

“It will be of interest to mention that success has attended our efforts to breed and propagate the Braconid wasp, which, as mentioned in last month’s report, is an insect enemy of the moth-borer of cane in New South Wales, where it is credited by Oliff with being a parasite of great economic importance.

“I am of opinion that the control of our large moth-borer (*Phragmatiphila truncata* Walk.) in the Cairns district is due mainly to the activities of this tiny wasp.

“The specimens bred by us this month from ratoons collected at Banna were confined in suitable cages with borer-caterpillars on 5th December, and having parasitised them, produced broods of wasps three weeks later (25th December). In view of the fact that each of these parasites is able to lay nearly a hundred eggs (our highest record here at present being 93), and, moreover, has a life-cycle of only three weeks, it is not surprising that moth-borer attack should be confined here to a few localities where it is seldom noticed except early in the season, and never assumes serious proportions. The parasite in question (*Apanteles nonagriæ* Oliff) is a minute black wasp, no bigger than a sandfly, and having threadlike antennæ, which in the male are much longer than the body, but a little shorter in the opposite sex. The female punctures the caterpillar by means of a special piercing instrument or ovipositor, and deposits eggs inside it, which in due course produce maggots that start at once to feed on the internal tissues. This larval stage occupies about fourteen days, after which the maggots leave the body of their host, and, remaining together, spin white, egg-like silken cocoons, which are usually concealed behind some dead leaf-sheath, but sometimes are located inside the tunnel of the bored ratoon.

“These cocoons, which occur side by side in a flattened mass, and are about three-sixteenths of an inch long, with rounded ends, finally develop a few days later into wasps.

“We hope to introduce this useful parasite as soon as possible into the Ayr district, where this year the moth-borer has occasioned serious losses in certain cane areas on Rita Island and elsewhere.

“Beetle Borer Parasite.

“Bred specimens of the tachinid fly-parasite of *Rhabdocnemis obscuris* Boisd., the well-known beetle-borer of cane, continue to emerge freely in our insectary from cane sticks artificially stocked with beetle grubs during November.

“Numbers of these parasites have been liberated this month (December) on plantations at Riverstone, and on land subject to borer on the banks of the Mulgrave River at Gordonvale. Several letters have been received from the Innisfail and Babinda districts, asking for tachinid flies, so, in order that all requests may be met, we intend to continue the breeding of this insect during January and February.

“Beetles as Food.

“A sample of beetle-meal prepared from our grey-back cockchafer has been submitted this month for analysis, and may prove to be a valuable food for poultry. The Curator of the Zoological Gardens in Sydney has tried for some years past to obtain meal of this nature for feeding insectivorous birds, and is prepared to offer a good price if the analysis should prove favourable. In the present instance the beetles collected were killed with hot water and dried at once in a simple home-made oven of galvanized iron. The bodies were then reduced to meal by being passed through an ordinary corn-crusher.

“It might be of interest to mention that a manure is prepared from bodies of the European cockchafer. Guenau states that this ‘is equal to that of the best manure as regards phosphoric acid and potash, and is eight times richer in nitrogen. One hundred pounds of beetles are, therefore,’ he remarks, ‘equal to 800 lb. of manure.’ In view of this statement it seems probable that the 22 tons of beetles collected one year in the Cairns district might have been turned to very profitable account. In the event of collecting being again taken up here, it would be advisable to look into this matter of the manurial value of our cane-beetle, and, if possible, defray in this way part of the expense of collecting.”

FOREIGN INGREDIENTS IN AGRICULTURAL SEEDS.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

Every purchaser should know the purity and germination of the seed that he intends to sow; also its freedom from diseased or insect-infested seeds. These matters can only be decided by a thorough examination of a large and truly representative sample. Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop, or even succeeding crops, may be wholly determined by the kind or condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the *purity* and *germination* of all seeds purchased, before sowing or offering them for re-sale.

ANALYSIS AND METHOD OF SAMPLING.

Samples of any seeds purchased or offered for sale as seed for sowing, may be sent to the Department of Agriculture for analysis. All samples must be drawn from the actual bulk in the sender's possession, and care should be taken to obtain a small quantity from each bag, carefully mixing the portions so obtained, in order to make the sample truly representative of the bulk.

MARKING OF SAMPLES.

All samples sent for analysis must have the following particulars plainly written thereon:—

Name of seed;

Quantity the sample represents, and marks, if any;

Name and full address of sender.

Example:—

Seed for analysis, representing 30 bags Japanese millet,

Ex A. Smith, Farmer, Westgate.

From T. Brown, Produce Merchant, Exmouth.

Samples should be addressed as follows:—

Seed for Analysis,

The Under Secretary,

Department of Agriculture and Stock,

Brisbane.

WEIGHT OF SAMPLES.

All samples of seed sent for analysis must not be less than the weights herein set out, and in the case of seeds containing a large amount of foreign ingredients double the weight mentioned should be sent.

Wheat, Oats, Barley, Maize, Rice, Rye, Cowpeas, Tares, Peas, Beans . . .	8 oz.
Lucerne, Sweet Clover, Sorghum, <i>Sorghum sudanense</i> (Sudan grass), Panicum, Millet, Linseed, Canary, Prairie Grass, Buckwheat, Cotton	4 oz.
Rhodes grass, <i>Paspalum dilatatum</i> , Rye grass, Cocksfoot, Couch grass . . .	2 oz.
All agricultural seeds other than those included above	2 oz.

FREE ANALYSIS FOR FARMERS.

No charge is made to farmers sending in samples of any seeds purchased by them for their own sowing, providing the following particulars are plainly written on each sample sent:—

- Vendor's name and address.
- Name of seed.
- Quantity purchased.
- Date of delivery.
- Locality where seed is to be sown.
- Name and address of purchaser.

VENDORS' FEE FOR ANALYSIS.

A fee of 2s. 6d. per sample will be charged for all samples sent by vendors for purposes of analysis. A vendor within the meaning of the Pure Seeds Acts is:—

“Any person who sells, or offers or exposes for sale, or contracts or agrees to sell or deliver any seeds.”

It will, therefore, be noted that the common acceptance of the Acts as referring only to seedsmen is erroneous. A Produce Merchant, Storekeeper, Auctioneer, Farmer, or grower of the seed are vendors under the Acts whenever they sell, offer, expose for sale, contract or agree to sell any seeds for sowing.

THE PURE SEEDS ACTS.

All vendors of seeds for sowing must comply with the Pure Seeds Acts and Regulations thereunder, copies of which may be obtained from the Government Printer, George street, Brisbane, for 1s. 7d. post free.

INVOICE MUST BE GIVEN BY VENDOR.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

“The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds.”

FOREIGN INGREDIENTS.

Foreign ingredients include dead and non-germinable seeds, diseased or insect-infested seeds, weed seeds, or seeds of any cultivated plant other than that to which the sample purports to belong. Also inert matter, which includes chaff, dust, stones, or any material other than seeds, and broken seeds less in size than one-half of a complete seed.

The proportion or amount of foreign ingredients that may be contained in any seeds is prescribed by the Regulations.

“B” GRADE SEEDS.

Seeds in which the amount of foreign ingredients exceeds the proportion set forth in Schedule A of the Regulations, but does not exceed the proportion set forth in Schedule B, may be sold as seeds for sowing, providing they are contained in bags or packages to each of which is affixed a label, brand, or stamp, clearly and indelibly marked, specifying: The kind or kinds of such seeds; that the seeds are “B” grade, for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed; the name and address of vendor. All invoices relating to such seeds must be distinctly marked “B Grade Seeds.”

QUALITY FIRST.

The best is the cheapest, whatever the price, and quality should be the one and only consideration that determines a purchase. An opinion as to the quality or condition of any agricultural seed is useless unless based on the actual facts revealed by an analysis conducted under uniform scientific methods. This work is undertaken by the seed laboratory of the Department of Agriculture. Before sending samples, care should be taken to see that they are not only drawn from, but truly representative of, the bulk, and are marked in accordance with the particulars beforementioned.

COVERING LETTER.

All samples with *covering letter*, should be addressed to—

The Under Secretary,

Department of Agriculture and Stock,
Brisbane.

THE ALL-HARVESTER MACHINE.

At a recent agricultural exhibition in Great Britain there was exhibited an attachment to a harvester which forms the first step towards eliminating all hand-labour in the harvest field, apart from the mere driving of the machine. This attachment is intended for standing the sheaves up after the harvester has cut and bound them. The judges at the exhibition thought so well of it that they awarded the makers a silver medal.

Answers to Correspondents.

RHODES GRASS.

R. F. M. (Gayndah)—

Rhodes grass has proved to be among the best for your district, and, like other fodder grasses, it responds to fair treatment. Reported failures are often due to overstocking, particularly before the grass has re-seeded and so firmly established itself. An absolute heavy stock-carrying drought-resister is hard to get.

Give Rhodes another chance.

PREPARING SAGE FOR MARKET.

E. D. (Spring Creek, Stanthorpe)—

Cut sage with sickle and dry on hessian or calico sheets.

TOBACCO-GROWING.

H. F. H. (Apsley, Winton)—

The present unsatisfactory system of marketing reduces the chances of success in tobacco-growing.

BANANA SOIL AND POTASH.

T. G. (Mount Lawson)—

The Director of Fruit Culture advises the use of a complete fertiliser suitable for bananas, described in previous issues of the Journal, and obtainable from any dealer in manures.

TO DESTROY MEAT ANTS.

F. L. W. (Birkdale)—

Pour half a cup of carbon bisulphide (any chemist) over the ants' nest. Stand off a safe distance and throw a match on to the soaked surface. A slight explosion will follow. Immediately after, cover the ant bed with a bag well saturated with water. The greatest care should be exercised in handling, keeping clothes free of, and igniting the compound, as it is highly explosive.

HAY-STACK MEASUREMENTS.

M. T. MILLS, (Christmas Creek)—

To calculate the contents of an oblong stack, multiply the length by the breadth, and the product by the total average height, and divide by 350 for old hay and 400 for new hay. This will give a rough idea of the contents, in tons. To find the total average height, add the height from the ground to the eaves to half the height from the eaves to the ridge.

Example.—

D to E = 12 ft.; $\frac{1}{2}$ of E to F = 5 ft.; $12 + 5 = 17$ = total average height.

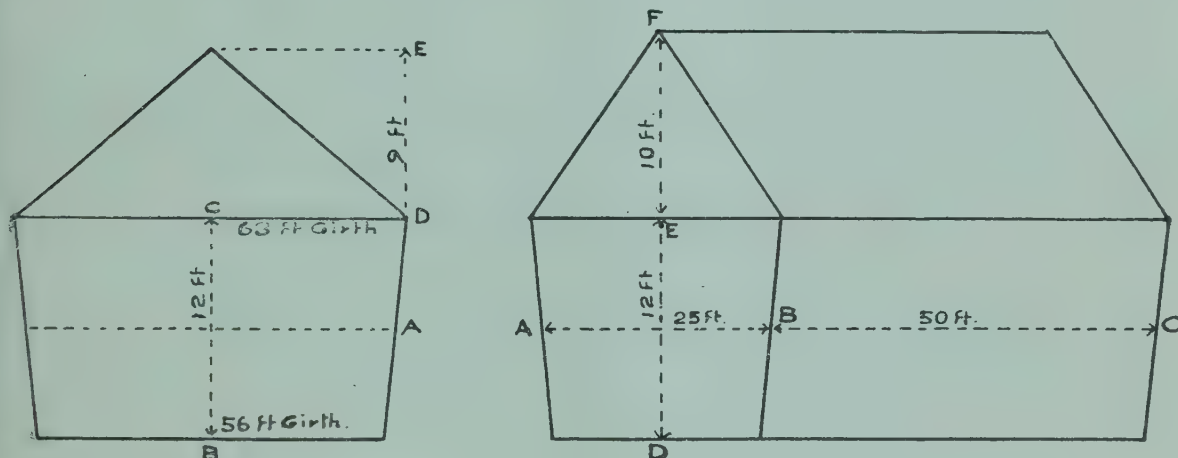
A to B = breadth = 25 ft. B to C = length = 50 ft.

$50 \times 25 \times 17 = 21,250$ = total contents of stack in cubic feet.

$21250 \div 400 = 53\frac{1}{8}$ tons.

To calculate the contents of a round stack, take the girth at the bottom of the stack and add this to the girth at the eaves; half the sum is the mean girth. Square the mean girth, and multiply by $\frac{7}{88}$, which will give the area of the base. Multiply this by the height, and this will give the contents, in cubic feet, of the bottom part of the stack.

To find the contents of the top portion of the stack, square the top girth and multiply by $\frac{7}{88}$, by one-third of the height.



Example.—

Bottom Portion: Bottom girth, 56 ft. Top girth, 63 ft. $63 + 56 = 119 \div 2 = 59\frac{1}{2}$ ft.

A to A = $59\frac{1}{2}$ ft. = mean girth.

B to C = 12 ft. = height from ground to eaves.

$59\frac{1}{2} \times 59\frac{1}{2} \times \frac{7}{88} \times 12 = 3,379$ cub. ft. = contents of bottom portion of stack.

Top Portion: D to E = 9 ft. = height from eaves to top of roof. $9 \div 3 = 3$.

$63 \times 63 \times \frac{7}{88} \times 3 = 935.7$ cub. ft. = contents of top portion of stack.

Total: $3,379 + 935.7 = 4,314.7$ cub. ft. = total contents of stack.

$4,314.7 \div 400 = 10.7$ tons.

In the foregoing examples it is taken that the hay would go 400 cub. ft. to the ton. This is only approximate, as the weight per cubic foot varies considerably, according to the kind of hay, age, and other conditions. To ascertain the tonnage with any degree of certainty, it would be necessary to find the average weight of a cubic foot of the hay. This could be arrived at by cutting out cubes 1 ft. by 1 ft. by 1 ft. with a hay knife from different parts of the stack or hayshed, and weighing same.

Farm Notes for March.

Land on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that the young weeds will not make such vigorous growth during the next few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where blight has previously existed, or where there is the slightest possible chance of its appearing, preventive methods should be adopted—*i.e.*, spraying with "Burgundy mixture"—when the plants are a few inches high and have formed the leaves; to be followed by a second, and, if necessary, a third spraying before the flowering stage is reached.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Weevils are usually very prevalent in the field at this time of the year and do considerable damage to the grain when in the husk.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in all dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Packed cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bag or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *phalaris bulbosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which were too far advanced to benefit by the recent rains, and which show no promise of returning satisfactory yields of grain, would be well advised to convert these into ensilage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of sudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reached a suitable stage for converting into ensilage, it will be found that this method of conserving them has much to recommend it. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position by means of weighted wires.

Orchard Notes for March.

THE COAST DISTRICTS

As soon as the weather is favourable, all orchards, plantations, and vineyards that have been allowed to get somewhat out of hand during the rainy season should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out, as there is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit, whereas a lot of weedy overcrowded suckers will only give small bunches of under-sized fruit that is hard to dispose of, even at a low price.

The cooler weather will tend to improve the carrying qualities of the fruit, but care must still be taken to see that it is not allowed to become overdeveloped before it is packed, otherwise it may arrive at its destination in an overripe and, consequently, unsaleable condition. The greatest care should be taken in grading and packing fruit. Only one size of fruit of even quality should be packed. Smaller or inferior fruit should never be packed with good large fruit, but should always be packed separately.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of, plantations which are apt to become somewhat dirty during the gathering of the crop must be cleaned up. All weeds must be destroyed, and if blady grass has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be well worked and brought into a state of thorough tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green. Citrus fruits of all kinds require the most careful handling, as a bruised fruit is a spoilt fruit, and is very liable to speck or rot. The fungus that causes specking cannot injure any fruit unless the skin is first injured. Fruit with perfect skin will eventually shrivel, but will not speck. Specking or blue mould can therefore be guarded against by the exercise of great care in handling and packing. At the same time, some fruit is always liable to become injured, either by mechanical means, such as thorn pricks, wind action, hail, punctures by sucking insects, fruit flies, the spotted peach moth, or gnawing insects injuring the skin. Any one of these injuries makes it easy for the spores of the fungus to enter the fruit and germinate. All such fruit must therefore be gathered and destroyed, and so minimise the risk of infection. When specky fruit is allowed to lie about in the orchard or to hang on the trees, or when it is left in the packing sheds, it is a constant source of danger, as millions of spores are produced by it. These spores are carried by the wind in every direction, and are ready to establish themselves whenever they come in contact with any fruit into which they can penetrate. Specking is accountable for a large percentage of loss frequently experienced in sending citrus fruits to the Southern States, especially early in the season, and as it can be largely prevented by the exercise of the necessary care and attention, growers are urged not to neglect these important measures.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The flat bushel-case (long packer) commonly used for citrus fruits, does not lend itself to up-to-date methods of grading and packing, and we have yet to find a better case than the American orange case recommended by the writer when he came to this country from California in 1892, and which again proved its superiority in the recent shipment of oranges from South Australia to England. Failing this case, a bushel-case suggested by the New South Wales Department of Agriculture is, in the writer's opinion, the most suitable for citrus fruits, and were it adopted it would be a simple matter to standardise the grades of our citrus fruit, as has been done in respect to apples packed in the standard bushel-case used generally for apples throughout the Commonwealth. The inside measurements of the case suggested are 18 in. long, 11½ in. wide, and 10½ in. deep. No matter which case is used, the fruit must be sweated for seven days before it is sent to the southern markets, in order to determine what fruit has been attacked by fruit-fly, and also to enable bruised or injured fruit liable to speck to be removed prior to despatch.

Fruit-fly must be systematically fought in all orchards, for if this important work is neglected there is always a very great risk of this pest causing serious loss to citrus growers.

The spotted peach-moth frequently causes serious loss, especially in the case of navels. It can be treated in a similar manner to the codlin moth of pip fruit, by spraying with arsenate of lead, but an even better remedy is not to grow any corn or other crop that harbours this pest in or near the orchard. Large sucking-moths also damage the ripening fruit. They are easily attracted by very ripe bananas or by a water-melon cut in pieces, and can be caught or destroyed by a flare or torch when feeding on these trap fruits. If this method of destruction is followed up for a few nights, the moths will soon be thinned out.

Strawberry planting can be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be carefully followed. The later varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been given in the Granite Belt area in the course of the present season by Mr. Rowlands, the Tasmanian Fruit Packing Expert, whose services the Queensland Government have been fortunate in securing, and whose practical advice and instruction should enable the growers in that district to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes, and it is pleasing to note that some growers are packing their fruit very well. Those who are not so expert cannot do better than follow the methods of the most successful packers.

Parrots are frequently very troublesome in the orchards at this time of the year, especially if there is a shortage of their natural food. So far, there is no very satisfactory method of combating them, as they are very difficult to scare, and, though shooting reduces their numbers considerably, they are so numerous that it is only a subsidiary means.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the

soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of requiring water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening state, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much water is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light irrigation is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING DECEMBER, 1921 AND 1920, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Dec.	No. of Years' Records.	Dec., 1921.	Dec., 1920.		Dec.	No. of Years' Records.	Dec., 1921.	Dec., 1920.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	7.40	20	6.42	8.71	Nambour ...	6.00	25	13.76	3.67
Cairns ...	9.14	39	10.26	8.37	Nanango ...	3.47	39	13.11	1.28
Cardwell ...	8.34	49	13.63	4.23	Rockhampton ...	4.19	34	19.42	0.98
Cooktown ...	7.07	45	7.97	6.89	Woodford ...	5.19	34	12.73	2.08
Herberton ...	5.51	34	7.27	7.85					
Ingham ...	7.13	29	9.55	6.26					
Innisfail ...	12.10	40	17.72	5.31					
Mossman ...	12.34	13	24.28	9.51					
Townsville ...	5.53	50	5.55	1.21					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
					Dalby ...	3.12	51	9.19	2.61
Ayr ...	3.70	34	9.09	2.78	Emu Vale ...	3.46	25	6.52	3.01
Bowen ...	4.32	50	9.70	2.19	Jimbour ...	3.02	33	7.68	0.88
Charters Towers ...	3.51	39	3.50	3.67	Miles ...	2.43	36	6.02	2.84
Mackay ...	6.76	50	13.38	2.37	Stanthorpe ...	3.42	48	6.61	2.84
Proserpine ...	8.28	18	19.66	2.10	Toowoomba ...	4.11	49	8.07	4.10
St. Lawrence ...	4.22	50	18.01	0.92	Warwick ...	3.41	34	9.27	2.40
<i>South Coast.</i>					<i>Maranoa.</i>				
					Roma ...	2.29	47	4.89	2.50
Biggenden ...	4.11	22	12.50	3.55					
Bundaberg ...	4.43	38	15.89	10.59					
Brisbane ...	4.97	70	11.33	2.57					
Childers ...	4.91	26	15.45	7.90					
Crohamburst ...	Nil	Nil	Nil	3.09					
Esk ...	4.13	34	11.85	1.66					
Gayndah ...	3.78	50	11.11	6.98					
Gympie ...	5.62	51	11.14	3.07					
Glasshouse M'tains	6.34	13	11.67	2.77					
Kilkivan ...	4.08	42	12.33	3.17					
Maryborough ...	4.51	50	11.23	10.08					
					<i>State Farms, &c.</i>				
					Bungeworgorai ...	2.26	7	3.81	1.63
					Gatton College ...	3.26	22	Nil	2.14
					Gindie ...	2.63	22	2.16	1.49
					Hermitage ...	2.73	15	7.47	2.31
					Kairi ...	7.66	7	5.78	6.09
					Sugar Experiment Station, Mackay	7.99	24	14.50	2.04
					Warren ...	2.88	7	10.05	1.40

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December this year, and for the same period of 1920, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET. AT WARWICK.

1922.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5.0	6.51	5.24	6.46	5.45	6.25
2	5.1	6.51	5.25	6.46	5.45	6.24
3	5.1	6.51	5.26	6.45	5.46	6.23
4	5.2	6.51	5.27	6.45	5.46	6.22
5	5.3	6.52	5.28	6.44	5.47	6.20
6	5.4	6.52	5.28	6.43	5.48	6.19
7	5.4	6.52	5.29	6.42	5.49	6.18
8	5.5	6.52	5.30	6.42	5.50	6.17
9	5.6	6.52	5.31	6.41	5.50	6.16
10	5.6	6.52	5.31	6.41	5.51	6.15
11	5.7	6.52	5.32	6.40	5.51	6.14
12	5.8	6.52	5.33	6.39	5.52	6.13
13	5.9	6.52	5.34	6.38	5.52	6.12
14	5.9	6.52	5.35	6.38	5.53	6.11
15	5.10	6.52	5.35	6.37	5.53	6.9
16	5.11	6.52	5.36	6.36	5.54	6.8
17	5.12	6.52	5.37	6.35	5.54	6.7
18	5.12	6.52	5.38	6.34	5.55	6.6
19	5.13	6.52	5.38	6.34	5.55	6.5
20	5.14	6.52	5.39	6.33	5.56	6.4
21	5.15	6.51	5.39	6.32	5.56	6.3
22	5.16	6.51	5.40	6.31	5.57	6.2
23	5.17	6.51	5.40	6.31	5.57	6.1
24	5.18	6.50	5.41	6.30	5.58	5.59
25	5.19	6.50	5.41	6.29	5.58	5.58
26	5.19	6.50	5.42	6.28	5.59	5.57
27	5.20	6.49	5.43	6.27	6.0	5.56
28	5.21	6.49	5.44	6.26	6.0	5.55
29	5.22	6.48	...	...	6.1	5.54
30	5.23	6.48	...	...	6.1	5.53
31	5.23	6.47	...	...	6.2	5.52

PHASES OF THE MOON, ECLIPSES, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when summer time is not in force.

H. M.
 6 January ☾ First Quarter 8 24 p.m.
 14 " ○ Full Moon 12 37 a.m.
 20 " ☾ Last Quarter 4 0 p.m.
 28 " ● New Moon 9 48 a.m.
 Apogee on 3rd at 8.54 a.m.
 " on 30th at 10.24 p.m.
 Perigee on 15th at 9.48 a.m.

5 February ☾ First Quarter 2 52 p.m.
 12 " ○ Full Moon 11 18 a.m.
 19 " ☾ Last Quarter 4 18 a.m.
 27 " ● New Moon 4 48 a.m.
 Perigee on 12th at 9.0 p.m.
 Apogee on 27th at 12.48 a.m.

7 March ☾ First Quarter 5 22 a.m.
 13 " ○ Full Moon 9 14 p.m.
 20 " ☾ Last Quarter 6 43 p.m.
 28 " ● New Moon 11 3 p.m.
 Perigee on 13th at 9.30 a.m.
 Apogee on 26th at 5.36 a.m.

The splendid phenomenon of an annular or ring-shaped eclipse of the sun will be seen, if clouds do not intervene, in North Africa (including part of the Suez Canal) and in South America on 27th and 28th March.

The only other eclipse of the year will be the Great Australian Total Eclipse of the Sun on 21st September, of which special particulars will be given.

The apparent proximity of the moon and Delta Tauri early in the evening of 9th January will be of interest to those who possess telescopes or binoculars, also the occultation of Omicron Leonis on the 16th, about 1 o'clock in the morning. On 7th February Delta Tauri will be occulted by the moon about 4 o'clock in the morning, also another small star in the same constellation half an hour later, followed by another within three quarters of an hour after that.

The occultation of Jupiter by the moon on 16th February will unfortunately occur about sunrise at Brisbane, but may be observable at Oontoo, Birdsville, and other places in the far south-west.

The planet Jupiter will be coming into view before midnight in February and March; Venus will pass from west to east of the sun on 9th February; and Mercury from east to west on the 14th. Before the end of March Jupiter and Saturn will be prominent evening stars.

On 21st March the sun will rise almost exactly due east, and set due west, passing from south to north of the equator.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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MARCH, 1922.

PART 3.

STANDARDS OF PURITY AND GERMINATION PRESCRIBED FOR SEED OATS, BARLEY, RYE, AND WHEAT.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

“Many of our farmers have only a limited knowledge of weeds, and in many cases do not recognise those that are dangerous on their first appearance. Hence we have ‘One year’s seeding, seven years’ weeding.’ There are some weeds so noxious that if farmers knew their real character, and recognised the plants on their first appearance, they would postpone all other business until they were destroyed.”—H. Mackellar.

Although buyers and sellers of wheat, barley, oats, and rye are able to form a good idea as to their market value, experience shows that they are frequently misled as regards purity and germination. It is in fact impossible to determine with any accuracy the purity or germination by a casual inspection of the sample; all opinions as to the amount of weed seeds, non-germinable seeds, or other foreign ingredients should be based on actual facts revealed by the analysis and germination-test of a large sample drawn from the actual bulk.

The following table gives information as to the purity and germination of samples examined at the Departmental seed laboratory in the course of 1921:—

Kind of Seed.	Percentage of Samples Germinating, Between—				Percentage of Samples up to the Standard of Purity and Germination prescribed for—		Percentage of Samples which did not comply with the prescribed Standards on account of—	
	100-90	89-80	79-70	69-0	A Grade.	B Grade.	Impurities.	Germination.
	%	%	%	%	%	%	%	%
Barley, Cape	82.9	14.3	..	2.8	77.2	17.1	2.9	2.8
Barley, skinless	76.2	23.8	..	..	76.2	23.8	..	..
Barley, malting	84.6	15.4	..	..	77.0	15.3	7.7	..
Oats	72.5	13.7	9.8	4.0	68.6	19.6	7.8	4.0
Rye	80.0	20.0	..	..	80.0	20.0	..	..
Wheat	82.6	13.1	4.3	..	82.6	17.4	..	..

The attention of both buyers and sellers is directed to the Regulations under the Pure Seeds Acts, which prescribe the proportion or amount of foreign ingredients allowed in barley, oats, rye, and wheat. Every farmer should be interested in the subject, which closely concerns him both as a producer of the article and as the ultimate consumer. It is frequently stated that even among farmers there are more buyers than sellers; as this is true regarding oats and rye, greater care should be taken in their purchase.

STANDARDS PRESCRIBED BY THE REGULATIONS UNDER THE PURE SEEDS ACTS.
THE PROPORTION OR AMOUNT OF FOREIGN INGREDIENTS THAT MAY BE CONTAINED IN A GRADE SEEDS.

Kind of Seeds.	Inert Matter.						Diseased or Insect-infested Seeds.	Dead and Non-germinable Seeds.
			Seeds of weeds or seeds of any cultivated plant not included in (A.I.) which will not pass through a metal sieve perforated with round holes $\frac{1}{4}$ of an inch in diameter.	Seeds of weeds which will pass through a metal sieve perforated with round holes $\frac{1}{4}$ of an inch in diameter.	Seeds of any cultivated plant included under (A.I.) other than seeds of the kind to which the sample purports to belong.			
(A.I.)	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Barley	1	1	Nil	1	Nil	10		
Oats	1	1	Nil	1	Nil	15		
Rice	1	1	Nil	1	Nil	15		
Rye	1	1	Nil	1	Nil	10		
Wheat	1	1	Nil	Nil	Nil	10		
Maize	1	Nil	Nil	Nil	Nil	10		

THE PROPORTION OR AMOUNT OF FOREIGN INGREDIENTS THAT MAY BE CONTAINED IN B GRADE SEEDS.

Kind of Seeds.	Inert Matter.						Diseased or Insect-infested Seeds.	Dead and Non-germinable Seeds.
			Seeds of weeds or seeds of any cultivated plant not included in (B.I.) which will not pass through a sieve perforated with round holes $\frac{1}{4}$ of an inch in diameter.	The number of weed seeds which will pass through a metal sieve perforated with round holes $\frac{1}{4}$ of an inch in diameter contained in each ounce of the sample of the seeds in question.	Seeds of any cultivated plant included under (B.I.) other than seeds of the kind to which the sample purports to belong.			
(B.I.)	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Barley	2	2	10	2	Nil	25		
Oats	2	2	10	3	Nil	30		
Rice	2	2	5	2	Nil	25		
Wheat	2	2	5	2	Nil	25		
Rye	2	2	5	2	Nil	25		
Maize	2	1	Nil	Nil	Nil	25		

Any person who sells, or offers or exposes for sale, or contracts or agrees to sell or deliver, any seeds which contain a larger proportion or amount of foreign ingredients than is prescribed, is guilty of an offence against the Acts.

Samples of any seeds purchased or offered for sale as seed for sowing, may be sent to the Department of Agriculture for analysis. All samples must be drawn from the actual bulk in the sender's possession, and care should be taken to obtain a small quantity from each bag, carefully mixing the portions so obtained, in order to make the sample truly representative of the bulk.

A leaflet giving information as to size of samples and other particulars may be obtained from

The Under Secretary,
Department of Agriculture and Stock, Brisbane.

HORTICULTURAL NOTES.

By E. W. BICK, Curator, Botanic Gardens.

This is quite a busy month in the garden. Dahlias should now be flowering well. Remove all spent blooms to prevent plants seeding, as this lowers their vitality. When cutting flowers for any purpose, take off a fair amount of "wood"; this assists as a pruning. Chrysanthemums should be making good growth. Keep them well staked, and when plants commence to throw up flower stems, liquid manure occasionally will strengthen them, and they will produce better flowers. Towards the end of month put in carnation cuttings, and do not forget that to grow these favourite flowers successfully it is essential to keep raising young plants; the old ones cannot be relied upon. When taking cuttings, it is important to obtain them from healthy plants, as weak or diseased cuttings never develop into really good plants. The growths or side-shoots that are found about half-way up the stems make the best cuttings. Choose well-developed ones, because if too soft they will damp off; on the other hand, when too old and hard at the base they are slow in sending out roots. They should be taken when from 3 to 4 in. long. Remove them with a gentle pull downwards, then trim the base with a sharp knife and cut off the lower leaves. Do not pull them off, otherwise the bark is often injured and the cutting spoilt. The best cuttings usually produce the finest plants. They must not be allowed to lie about when taken off, but should be put in at once. The soil used should be a free, sifted loam and sand in equal parts; if available, a sprinkling of cocoanut fibre dust and powdered charcoal will be of material assistance. The cuttings will also root readily in pure sand. Use small pots, about 5 in.; crock and fill, pressing the compost or sand firmly, then use a dibber to put cuttings in, making sure that the soil is pressed firmly round each cutting. Then water, preferably with a can with a fine rose. They strike best if kept in a sheltered place in a small frame or box away from wind or draughts. Procure a box that will be 2 or 3 in. above the tops of cuttings; the bottom must not be watertight, it may be knocked out altogether. Plunge the pots of cuttings in ashes or cocoanut fibre refuse, and cover top of box with a sheet of glass. The glass should be partly removed each morning and replaced in the evening. Gradually increase the air supply until after about a month, when the glass can be done without altogether, as by then the cuttings should be rooted. When rooted, pot off young plants. Handle carefully, as the young roots are very tender. Make the soil firm, but not hard. Should pots not be available, the cuttings can be struck in a box, but see that you have good drainage; also, if glass is not at hand, use oiled calico or hessian, and keep them from direct rays of the sun: Give a gentle spray of water as required, but do not keep them wet and sodden, but just moist.

This is also the time for the main sowing of sweet peas. Trench or dig your ground deeply, and manure freely (well-decayed cow manure is about the best), and see that you have good drainage, but do not have your plants too close together, as one robs the other. Exercise care in planting seed. Should you have planted too thickly, thin out just before the plants begin to run.

A planting may now be made of bulbs, such as anemone, babianas, freezias, gladioli, ixias, ornithogalums, narcissus, ranunculus, sparaxis, and sprekelia (Jacobaea lily). A free soil is necessary for most kinds; fresh manure should never be used, and a place that has been fertilised heavily for a previous crop is suitable. Freezias are very useful, grown in 6-in. pots, as they flower so freely.

A good sowing of seeds for winter flowering plants should now be made, such as antirrhinums, daisies, calliopsis, candytuft, canterbury bells, carnation, marguerite, dianthus, delphiniums, hollyhocks, hunnemannia, larkspur, lobelia, mignonette, pansy, stocks, phlox drummondi, verbenas, wallflowers, and poppies, including the Iceland variety. This last has rapidly come to the front in the Southern States as a florists' flower; they are exceptionally useful for decorative purposes, lasting when cut for quite a long time. Plant the seed as early as possible.

SEED WHEAT FOR DISPOSAL.

Better and more reliable varieties of wheat, higher average yields per acre, and a generally improved standard in the milling quality of grain have latterly done much towards increasing the popularity of this crop and placing Queensland in the position of being fully able to meet her own requirements and have a small surplus for export purposes.

After experimenting and testing several varieties, many growers have already chosen those which suit their respective requirements. Others, apparently, are not fully alive to the advantages to be gained by systematic effort of this character.

It is recognised in practice that no single variety of wheat combines all the essentials required to meet the varying conditions of soils, seasons, and climatic conditions under which grain is produced; consequently it follows that a close study of the characteristics of individual varieties and the testing of new and improved wheats is a medium whereby growers can improve their own position, and that of the industry generally.

Reference was made in the January number of this journal to the fact that, as a result of the Department's efforts in the breeding and selection of wheats for Queensland conditions, approximately 1,000,000 bushels of grain from this source were harvested in 1920.

Wheatbreeding work and the testing of highly improved strains are still being carried on in an endeavour to produce rust-resisting and dependable varieties for the betterment of this industry in our State.

Pure-graded seed of several kinds (in not less than 1-bushel nor more than 9-bushel lots) is being offered for sale this season at 7s. 6d. per bushel, railage paid to the purchaser's nearest railway station.

Orders for any of the varieties (referred to in the letterpress of this issue) should be sent to the Under Secretary for Agriculture and Stock, Brisbane, accompanied by the necessary remittance.

Applications will be treated according to priority of order, but a second choice should be made from the list of varieties being offered. Where stocks of any particular variety of grain have been absorbed by previous orders, the Department will substitute another variety resembling it, unless specifically advised not to do so.

As none of the grain has been "pickled" for the prevention of smut (bunt), prospective growers are recommended to treat their seed wheat with bluestone and lime, according to the usual formula.

DIRECTIONS FOR PICKLING WHEAT (BLUESTONE AND LIME TREATMENT).

Mix 1 lb. of bluestone* or copper sulphate with 5 galls. of water in a wooden or glazed earthenware vessel. Suspend bluestone in a bag just below surface of water and leave overnight.

Iron or metallic vessels are not suitable for bluestone mixture.

A hogshead is to be preferred, sawn into halves.

Rig up a fork and lever alongside of tub to facilitate lifting of wheat in and out of tub.

Use open-mesh jute bag (bran bag) for dipping.

The secret of dipping is the rapid and even dipping of each grain, and, to secure this, agitate the grain by stirring whilst in the pickling mixture.

Three minutes is sufficient for dipping, after which the bag should be allowed to drain on two pieces of scantling, allowing the drainings to run into the pickling tub.

Lime solution—

Quicklime, 2½ lb.

Slack lime, with sufficient water to reduce to consistency of cream, placed in one of the half-casks for the purpose, and add up to 22 galls. of water.

Transfer wheat from bag in which it was dipped in bluestone mixture to a similar open-meshed bag, and dip in lime solution for two minutes.

Drain and dry thoroughly by spreading in thin layers on bags or tarpaulins.

To prevent re-infection of grain—

Dip all bags used for conveying seed after pickling in bluestone mixture, and dry in the open.

If dried out thoroughly after pickling, grain may be kept for some weeks before sowing.

* The current wholesale quotation for bluestone in Brisbane is 60s. per cwt.—ED.

1.	2.	3.
AN ESTABLISHED QUEENSLAND VARIETY.	AN ESTABLISHED QUEENSLAND VARIETY.	UNNAMED CROSSBRED.



AMBY.

BUNGE, No. 1.

BUNGE-INDIAN PEARL
CROSS, SELECTION 4.

4.
UNNAMED
CROSSBRED.

5.
UNNAMED
CROSSBRED.

6.
UNNAMED
CROSSBRED.



BUNGE-
INDIAN PEARL
CROSS,
SELECTION 9.

BUNGE-
MANITOBA CROSS,
SELECTION 5.

BUNGE-
MANITOBA CROSS,
SELECTION 7.

7.
UNNAMED CROSSBRED.

8.
CEDRIC.

9.
INGLEWOOD.



BUNGE-MANITOBA CROSS,
SELECTION 9.

BUNGE-CEDAR CROSS.

BUNGE-FEDERATION CROSS,
SELECTION 33.

10.
GUNDI.

11.
PUSA No. 4.

12.
PATRIOT.



BUNGE-
FEDERATION CROSS,
SELECTION 37.

IMPORTED
INDIAN
VARIETY.

BUNGE-
DURHAM CROSS,
SELECTION 57.

Name or Stud Number.	Period Recommended for Sowing	CHARACTERISTICS.						Rust Resistance.	Remarks.
		Stools.	Flag.	Straw when Ripe.	Ear.	Grain.			
1. Amby May .. ..	.. ..	Well ..	Medium amount	Of medium tallness and stoutness; not inclined to lodge	Bald; white chaff; holds grain well	Plump, medium hard, semi-translucent	Good ..	Established good milling and main crop variety; adaptable to both light and heavy soils. Suitable for all grain districts. Yields of 36 bushels per acre obtained in Maranoa district last year.
2. Bunge No. 1	Middle of May to third week in June	Light ..	Light ..	Of medium tallness, tough, somewhat slender, inclined to lodge if crop rank	Bald; white chaff; holds grain fairly well	Above medium size; hard, translucent	Good ..	Established, good general purpose variety; suitable for chief grain districts. Will thrive on heavy soils, but is more suited to those of a lighter class.	
3. B. x I.P. 4 (Bunge and Indian Pearl Cross)	Middle of May to third week in June	Light ..	Light ..	Of medium height, slender, willowy, inclined to lodge if crop rank	Bald; light brown chaff; holds grain fairly well	Medium size, plump, reddish coloured; hard; bright; thin skin	Fair ..	Yielded 25 bushels to the acre in Jandowae district. More suited to light than to heavy soils.	
4. B. x I.P. 9 (Bunge and Indian Pearl Cross)	Middle of June	Light ..	Light ..	Resembles B. x. I.P. 4, but stands up better against heavy winds	Bald; white chaff; holds grain well	Medium size, rice-like; somewhat narrow, hard, bright, attractive grain	Fairly good	Yielded 28½ bushels to the acre in Bell district; has averaged over 24 bushels per acre at Roma State Farm. Suited for chief grain-growing districts, preferably on light soils, and is of a quick-maturing habit.	
5. B. x M. 5 (Bunge and Manitoba Cross)	Early in May	Well ..	Medium amount	Tough; of medium tallness and stoutness; erect habit, not inclined to lodge	Bald, flattened, attractive looking; white chaff, holds grain well; prolific type	Red, medium, plump, attractive grain of medium hardness	Good ..	Yielded 27 bushels in Inglewood district. Good milling variety; suitable for main crop sowing; stands up well on black soils.	
6. B. x M. 7 (Bunge and Manitoba Cross)	Early in May	Well ..	Medium amount	Tough; of medium tallness and stoutness; erect habit, not inclined to lodge	Bald, flattened, slightly tapering; white chaff, holds grain well	Medium size; bright, plump, attractive grain, fairly hard; smooth, thin skin	Good ..	Yielded 28½ bushels per acre at Inglewood. Good milling variety. Thrives well on black soils; a good saleable type of grain.	

Name or Seed Number.	Period Recommended for Sowing.	CHARACTERISTICS.						Remarks.
		Stooks.	Flag.	Straw when Ripe.	Ear.	Grain.	Rust Resistance.	
7. B. x M. 9 (Bunge and Manitoba Cross)	Early in May	Fair	Medium amount	Tall growing; of medium stout- ness; fairly erect habit, but in- clined to lodge if rank	Bald, smooth, tapering; white chaff; holds grain moder- ately well	Long, narrow pointed; dull red, somewhat starchy grain, softer than B. x M. 5	Fairly good	Yielded 25½ bushels per acre at Inglewood. Thrives fairly well on black soils.
8. Cedric (Cedar and Bunge Cross)	Middle of May to second week in June	Fair	Light	Of medium tall- ness, somewhat slender; tough, willowy; not inclined to lodge	Bald; faint red- dish tinged chaff; holds grain fairly well	Medium size, full- bodied, dull red colour; of medium hard- ness	Good	Yielded 30 bushels at Roma State Farm and 30 bushels at Inglewood; attractive class of grain; good milling quality, suitable for main crop sowing on a variety of soils.
9. Inglewood (Bunge and Federation Cross)	Early in May	Well	Abundant	Not tall; stiff, erect habit; of medium stout- ness, somewhat soft	Bald; reddish coloured, holds grain well	Medium size; amber coloured grain, of medium hardness	Fair	Prolific yielder under favourable con- ditions, over 37 bushels at Ingle- wood. Suitable for South-Western districts, more so than on the Downs
10. Gundi (Bunge and Federation Cross)	Early in May	Well	Abundant	Not tall; stiff, erect habit; of medium stout- ness, somewhat soft	Bald; smooth, light brown in colour, holds grain well	Medium size, somewhat rough skin, white in colour	Fair	Prolific yielder under favourable con- ditions, over 37 bushels at Ingle- wood. Suitable for South-Western districts, more so than on the Downs.
11. Pusa No. 4 (Indian)	Late May and early in June	Fair	Medium	Medium height and stoutness; erect habit, not in- clined to lodge	Bald; velvet chaff, holds grain well	Medium size, plump, bright, translu- cent grain	Good	Yielded 32 bushels at Roma State Farm and 24 bushels at Allora. Suitable for main crop sowing on both light and heavy soils.
12. Patriot (Bunge and Durum Cross)	May	Fair	Medium	Medium height and stoutness; erect habit, not in- clined to lodge	Tapering; bald; white chaff; holds grain well	Short, dull starchy plump, yellow;	Good	Yielded 28½ bushels at Roma State Farm. Has also given satisfactory results in the South-Western dis- tricts.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1922.

Extremely hot weather was again experienced during January, which considerably upset the laying. On the 29th of the month 110 deg. were registered inside the buildings on the poultry section. One death occurred through heat apoplexy (H. Chaille's "E" Black Orpington). Several of the birds are now in moult. T. Fanning's White Leghorns again head the list with a score of 155 eggs for the month. The feeding of the birds was not as good as one would care to see it, but the loss of appetite may be accounted for by the trying weather conditions. Following are the individual records:—

Competitors.	Breed.	Jan.	Total.
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LIGHT BREEDS.

*J. M. Manson	White Leghorns ...	142	1,337
*W. and G. W. Hindes	Do.	132	1,317
*T. Fanning	Do.	155	1,286
*Mrs. R. Hodge	Do.	136	1,285
*H. Fraser	Do.	135	1,250
B. Gill	Do.	99	1,241
*C. M. Pickering	Do.	108	1,182
*Geo. Trapp	Do.	86	1,176
Oakleigh Poultry Farm	Do.	119	1,173
F. Birchall	Do.	103	1,171
*W. Becker	Do.	111	1,143
*R. C. J. Turner	Do.	114	1,130
*H. C. Towers	Do.	93	1,127
*Thos. Eyre	Do.	108	1,125
R. C. Cole	Do.	97	1,119
*Thos. Taylor	Do.	117	1,118
H. C. Thomas	Do.	74	1,117
*C. Goos	Do.	124	1,111
W. A. Wilson	Do.	96	1,108
Mrs. E. White	Do.	118	1,097
*J. W. Newton	Do.	86	1,096
*S. L. Grenier	Do.	111	1,086
*E. Chester	Do.	105	1,081
*Mrs. L. Anderson	Do.	120	1,076
Bathurst Poultry Farm	Do.	112	1,076
*E. A. Smith	Do.	107	1,075
J. W. Short	Do.	118	1,072
*G. W. Williams	Do.	111	1,070
M. F. Newberry	Do.	90	1,060
H. Stacey	Do.	107	1,046
*B. Chester	Do.	90	1,045
W. Barron	Do.	93	1,044
*H. P. Clarke	Do.	125	1,033
*Haden Poultry Farm	Do.	110	1,031
O. C. Goos	Do.	90	1,006
Mrs. E. Z. Cutcliffe	Do.	80	968
Linquenda Poultry Farm	Do.	100	954
E. Stephenson	Do.	83	953
W. M. Glover	Do.	81	910
Brampton Poultry Farm	Do.	76	898
*W. and G. W. Hindes	Brown Leghorns ..	53	894

EGG-LAYING COMPETITION—*continued.*

Competitors.					Breed.	Jan.	Total.
HEAVY BREEDS.							
T. Fanning	...	...	...	...	Black Orpingtons	103	1,293
*R. Burns	...	...	...	...	Do.	113	1,269
*T. Hindley	...	...	...	...	Do.	121	1,239
*A. E. Walters	...	...	...	...	Do.	119	1,237
W. Becker	...	...	...	...	Langshans	120	1,235
*Parisian Poultry Yards	...	...	...	...	Black Orpingtons	129	1,215
*C. C. Dennis	...	...	...	...	Do.	116	1,183
*Jas. Ferguson	...	...	...	...	Chinese Langshans	81	1,164
Geo. Muir	...	...	...	...	Black Orpingtons	102	1,141
*E. Morris	...	...	...	...	Do.	103	1,139
Rev. A. McAllister	...	...	...	...	Do.	86	1,138
Jas. Ryan	...	...	...	...	Rhode Island Reds	89	1,133
*E. F. Dennis	...	...	...	...	Black Orpingtons	98	1,111
Jas. Every	...	...	...	...	Langshans	91	1,081
*J. Cornwell	...	...	...	...	Black Orpingtons	92	1,079
*N. A. Singer	...	...	...	...	Do.	101	1,077
Jas. Potter	...	...	...	...	Do.	57	1,055
*R. Holmes	...	...	...	...	Do.	114	1,034
*J. E. Smith	...	...	...	...	Do.	116	1,032
*E. Stephenson	...	...	...	...	Do.	94	1,001
*H. M. Chaille	...	...	...	...	Do.	96	996
*E. Oakes	...	...	...	...	Do.	113	995
*A. Shanks	...	...	...	...	Do.	85	995
G. Cumming	...	...	...	...	Do.	91	988
*Mrs. G. Kettle	...	...	...	...	Do.	96	981
J. W. Newton	...	...	...	...	Do.	85	949
F. Harrington	...	...	...	...	Rhode Island Reds	84	900
T. C. Hart	...	...	...	...	Black Orpingtons	90	846
Total	...	...	...	...	...	7,100	75,591

* Indicates that the pen is being single tested.

DETAILS OF SINGLE TEST PENS.

Competitors.				A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.										
J. M. Manson	..	..	..	212	227	247	215	249	187	1,337
W. and G. W. Hindes (W.L.)	..	..	..	231	206	217	234	228	201	1,317
T. Fanning	..	..	..	235	206	230	201	205	209	1,286
Mrs. R. Hodge	..	..	..	213	214	236	220	224	178	1,285
H. Fraser	..	..	..	244	180	219	214	211	182	1,250
C. M. Pickering	..	..	..	219	200	204	178	210	171	1,182
Geo. Trapp	..	..	..	211	188	211	189	196	181	1,176
W. Becker	..	..	..	213	211	178	177	211	153	1,143
R. C. J. Turner	..	..	..	190	179	185	181	191	204	1,130
H. C. Towers	..	..	..	202	179	189	155	174	228	1,127
Thos. Eyre	..	..	..	201	184	151	193	208	188	1,125
Thos. Taylor	..	..	..	189	187	184	160	174	224	1,118
C. Goos	..	..	..	194	202	161	146	163	245	1,111
J. W. Newton	..	..	..	190	203	211	189	128	175	1,096
S. L. Grenier	..	..	..	175	208	156	188	185	174	1,086
E. Chester	..	..	..	205	178	162	177	174	185	1,081
Mrs. L. Anderson	..	..	..	187	194	170	174	190	161	1,076
E. A. Smith	..	..	..	217	164	198	183	175	138	1,075
G. Williams	..	..	..	239	194	151	154	175	157	1,070
B. Chester	..	..	..	145	163	204	179	187	167	1,045
H. P. Clarke	..	..	..	222	142	179	145	186	159	1,033
Haden Poultry Farm	..	..	..	113	175	192	190	175	186	1,031
W. and G. W. Hindes (B.L.)	..	..	..	133	162	137	116	139	207	894

DETAILS OF SINGLE TEST PENS—*continued*.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	159	193	258	194	218	247	1,269
T. Hindley	223	213	225	169	194	215	1,239
A. E. Walters	238	213	201	200	186	199	1,237
Parisian Poultry Farm	213	200	197	264	151	190	1,215
C. C. Dennis	196	179	179	220	207	202	1,183
J. Ferguson	187	180	186	224	197	190	1,164
E. Morris	208	197	140	210	190	194	1,139
E. F. Dennis	173	201	178	174	185	200	1,111
J. Cornwell	158	187	176	198	164	196	1,079
N. A. Singer	190	173	179	181	163	191	1,077
R. Holmes	146	183	181	183	201	140	1,034
J. E. Smith	222	238	163	124	145	140	1,032
E. Stephenson	201	161	180	178	125	156	1,001
H. M. Chaille	126	180	176	201	171	142	996
E. Oakes	160	170	170	190	147	158	995
A. Shanks	138	165	176	178	151	187	995
Mrs. G. Kettle	160	190	213	110	147	161	981

CUTHBERT POTTS,
Principal.

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 17th February, 1922) from the Entomologist, Mr. E. H. Jarvis:—

“In the course of the past month our time has been largely occupied with very necessary laboratory work in connection with certain methods of control to be directed this season against second and third stage grubs of the cane-beetle *Lepidoderma albohirtum*.

“Initial experiments with miscellaneous preparations, conducted by the writer last November, led to the discovery of two substances that appear well worthy of investigation. These will be thoroughly tested and the results reported later on.

“I have already pointed out that although ideal methods of combating this insect are admittedly those in which we succeed best in preventing oviposition by destroying as many egg-laden female beetles as possible, the greater length of the grub stage compensates to some extent for its secondary importance, since it admits of the practice of control measures throughout a period of about six months, while the sphere of action of this pest underground is greatly restricted.

“OUR FIGHT AGAINST ANTS AND VEGETABLE PARASITES.

“Allusion has been made from time to time in these reports to a small black ant (*Pheidole megacephala*) which occurs freely in most canefields, where it does good service by destroying caterpillars of moth-borers, &c. In the laboratory and insectary, however, where its presence is anything but desirable, it proves a continual source of annoyance. In one of our large cages, for example, built recently for rearing tachinid-fly parasites, the legs were stood, as usual, in pans of water, and before planting the canes containing borer grubs the soil (about 36 cub. ft.) was twice fumigated with carbon bisulphide, and the surface afterwards treated with boiling water. This answered for a time only, until the swarming period occurred, when a few of the winged female ants flew unobserved on to the sides of the cage, and crawling between the boards invaded the forbidden soil, forming colonies consisting of thousands of individuals, which a week or so later were found to have taken complete possession, and to be actually nesting in some of the bored canes. This voracious little ant will devour, alike, leaf-feeding caterpillars and other insects, household foodstuffs of any kind, or newly hatched featherless birds. It is supposed to be a native of Mauritius, but is now of world-wide distribution.

“In spite of such drawbacks, fully 200 tachinid flies, intended for distribution at Babinda and South Johnstone, emerged in this cage towards the end of December. Unfortunately, however, a spell of wet weather lasting about a fortnight set in at this time, establishing climatic conditions eminently favourable to the development of a certain fungus (*Empusa* sp.) which straightway attacked these parasites.

"Most people have occasionally noticed house flies when killed by *Empusa musca* sticking, as if glued, to a window pane, with wings and legs fully extended and the body swollen, yellowish, and mouldy-looking. Tachinid flies exhibiting this characteristic appearance were found each day adhering to the sides of the cage (mosquito netting) and to leaves of shade plants, &c. In a week or less this vegetable parasite had accounted for more than 50 per cent. of the flies.

"This fungus doubtless operates as a controlling factor in canefields during the wet season, probably affecting broods of flies emerging between December to February.

"FUMIGATING CANE GRUBS.

"The question of machine treatment for administering bisulphide of carbon in canefields is still receiving consideration. Mr. Dawson's machine was submitted to a field test last November, but did not prove satisfactory. A continuous flow of bisulphide was administered from one side of an iron tooth drawn through the soil. In the first trial no provision was made for filling in the furrow left by this tooth, or consolidating the soil above the line of injection by some downward pressure. The bisulphide, being left in loosened-up earth which was dry overhead, doubtless escaped upwards during the ordinary course of evaporation of the moisture. Mr. Dawson deserves credit for being the first, I believe, to attempt machine treatment for the fumigation of cane grubs; such pioneering work is always commendable.

"Some of the growers here are applying bisulphide this season by means of the "Danks injector." The following hints on the use of this fumigant may be found useful:—

- (1) Injections in light soils among young plant cane should not be made closer than about 6 in. from the plants, and 18 in. apart; and need only be applied on one side of a line of stools.
- (2) Injections made during high temperatures or when the soil is too dry may injure or kill young cane.
- (3) Fumigation should *not* be carried out at a time when the ground is dry or cracked, or when its porosity is closed by excess of moisture.
- (4) In red, volcanic country the soil is generally open and in good condition for treatment a few days after heavy rain, as the surface, being then caked, prevents escape of the bisulphide fumes, and all that is necessary is to close the holes made by injections.
- (5) Sandy soils are in fair condition for treatment after a light rain.
- (6) Do not cultivate the soil for a week or so after treatment.
- (7) An application of carbon bisulphide greatly improves exhausted soils, and destroys certain injurious bacteria.
- (8) Before application, examine the roots of a few stools to find depth at which the grubs are working, and then arrange things so that injections will be made an inch or two above them.

"LONGEVITY OF THE GREY-BACK COCKCHAFFER.

"In view of the fact that growers here appear to be uncertain regarding the length of life of our principal cane-beetle (*Lepidoderma albobirtum*), it may be well to mention that recent investigations by Labitte, who has made a special study of the longevity of beetles, has supplied us with valuable data in this connection. In his table giving the maximum period of existence for no less than forty-eight different species of coleoptera in captivity, we find that a tenebrionid beetle (*Blaps gigas*) lived 3,349 days, the lives of nine other species being found to vary from 1,005 to 1,219 days. An additional thirty-three beetles, belonging to different genera, had a maximum longevity of from 114 to 989 days, while the shortest life period among all these forty-eight beetles was found to be that of the common European cockchafer (*Melolontha melolontha*), an insect closely allied to our own cane-beetle, and of similar habits, which lived only thirty-one days. During the past seven years I have repeatedly found that captured specimens of albobirtum, taken just after emergence, do not live longer than from three to four weeks, even when kept under the most favourable conditions. It is interesting to note that the period of longevity in our own species happens to coincide with that of the European cockchafer.

"A NEW DIGGER-WASP PARASITE OF THE GREYBACK CANE-BEETLE.

"I have pleasure in recording *Scolia formosa* Guer, as being parasitic on the grubs of our cane-beetle (*Lepidoderma albobirtum* Water).

"This discovery was made in May, 1920, when the writer, chancing to obtain a female of this handsome digger-wasp at Gordonvale, succeeded in working out its life history. This specimen, which lived just eight weeks in confinement, laid twenty-four eggs on grubs of albobirtum, but refused to oviposit on those of *Lepidiota frenchi*.

“Only eleven cocoons were obtained, the remaining eggs having been destroyed by mites and other enemies. The life-cycle occupied 108 days, three being taken up by the egg stage, eleven by the maggot condition, and ninety-four by the cocoon stage. *Scolia formosa*, which is about the size of our common digger-wasp *Campsomeris tasmaniensis*, is mostly black, broadly banded on the abdomen with reddish-orange, while the thorax, legs, and head are rather densely clothed with reddish hairs. The egg differs from that of *Campsomeris* in being shorter and proportionately broader; and the larva, when about three-sixteenths of an inch long, is shining, smooth, pale greenish-yellow.

“*S. formosa* is rather a rarity in this district, so may be very subject to attacks from hyperparasites. In view of the fact that it occurs in other countries, so probably has acquired a habit of frequenting quite a number of different honey-bearing flowers, it seems likely that our ‘feather-horn’ beetle (*Macrosiagon pictipennis* Lea), which is hyperparasitic on *Campsomeris* wasps, may find *formosa* a readily accessible host.”

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE,

GATTON.

MILKING RECORDS OF COWS FOR DECEMBER, 1921.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
College Evening Glow	Jersey ...	10 Oct., 1921	855	5·6	57·45	
Auntie's Lass ...	Ayrshire ..	31 Oct. „	982	4·7	55·00	
Hedges Madge ...	Holstein ...	15 Aug. „	1,017	4·3	52·47	
Iron Plate ...	Jersey ...	12 July „	981	4·4	51·79	
Thyra of Myrtle-view	Ayrshire ...	31 July, „	1,246	3·7	51·45	
Prim ...	Holstein ...	9 Mar. „	1,221	3·6	48·80	
College Mignon ...	Jersey ...	7 July „	793	5·0	47·58	
Gatton Glitter ...	Guernsey ...	9 Sept. „	729	5·0	43·74	
College St. Margaret	Jersey ...	25 Sept. „	776	4·6	42·83	
Bellona ...	Ayrshire ...	26 June „	902	4·0	40·28	
Yarraview Snow-drop	Guernsey ...	14 Oct. „	639	4·8	36·80	
College Bluebell ...	Jersey ...	22 Oct. „	730	4·5	35·42	
Miss Security ...	Ayrshire ...	20 Aug. „	1,030	3·1	35·13	
Buttercup ...	Shorthorn...	28 Oct. „	947	3·2	33·52	
College Prima Donna	Holstein ...	17 Nov. „	936	3·2	33·17	
Nina ...	Shorthorn...	11 Nov. „	764	3·8	32·18	
Miss Betty ...	Jersey ...	7 July „	588	4·2	29·63	
Netherton Belle ...	Ayrshire ...	30 Nov., 1920	451	5·4	29·22	
Sweet Meadows ...	Jersey ...	31 Oct., 1921	416	5·3	28·45	
College Cold Iron	„ ...	10 Mar. „	484	4·8	27·92	
Glow VI. ...	Guernsey ...	28 Aug. „	675	3·7	27·58	
College Meadow Sweet	Holstein ...	17 May „	478	4·8	27·53	
Dawn of Warragarra	Jersey ...	15 Oct., 1920	397	5·5	26·32	
Little Buttercup...	Holst-in ...	12 Dec., 1921	804	2·7	26·04	
Miss Fearless ...	Ayrshire ...	26 May „	515	4·2	25·98	
College Cobalt ...	Jersey ...	6 Jan. „	420	5·0	25·20	
Yarraview Village Belle	Guernsey ...	6 Aug. „	370	5·5	24·36	
Comedienne ...	Jersey ...	26 Nov., 1920	381	5·2	23·77	
College Grandeur	„ ...	29 Dec. „	381	5·0	22·81	
Hedges Dutchmaid	Holstein ...	26 May, 1921	462	4·0	22·17	
College Sunrise ...	Jersey ...	12 June „	376	4·9	22·10	
Rosine ...	Ayrshire ...	19 Jan. „	523	3·8	22·01	
College Desire ...	„ ...	16 Nov. „	405	4·5	21·87	
Lady Amy ...	„ ...	27 June „	391	4·5	21·11	
Thornston Fairbairn	Jersey ...	15 Mar. „	322	5·4	20·86	
Hedges Nattie ...	Holstein ...	26 Feb. „	475	3·9	20·65	
College Wildflower	Jersey ...	10 Dec. „	390	4·4	20·59	

Rainfall, 760 points.

MILKING RECORDS OF COWS FOR JANUARY, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%.	lb.	
Auntie's Lass ...	Ayrshire ...	31 Oct., 1921	1,093	4.7	62.09	
College Evening Glow	Jersey ...	10 Oct. "	860	5.6	57.79	
Iron Plate ...	" ...	12 July "	1,043	4.4	55.00	
Hedges Madge ...	Holstein ...	15 Aug. "	992	4.3	51.18	
Lute ...	Ayrshire ...	8 Jan., 1922	846	4.9	49.74	
Thyra of Myrtleview	" ...	31 July, 1921	1,180	3.7	48.57	
College Mignon ...	Jersey ...	7 July "	796	5.0	47.76	
Prim ...	Holstein ...	9 Mar. "	1,150	3.6	46.00	
College Bluebell ...	Jersey ...	22 Oct. "	845	4.5	43.23	
Gatton Glitter ...	Guernsey ...	9 Sept. "	729	5.0	43.20	
Little Buttercup ...	Holstein ...	12 Dec. "	1,352	2.7	42.89	
Lady Mitchell ...	" ...	20 Dec. "	1,135	3.4	42.52	
College St. Margaret	Jersey ...	25 Sept. "	766	4.6	42.28	
Buttercup ...	Shorthorn...	28 Oct. "	1,153	3.2	40.64	
Bellona ...	Ayrshire ...	26 June "	893	4.0	40.10	
Netherton Belle ...	" ...	30 Nov., 1920	599	5.4	38.81	
College Wildflower	Jersey ...	10 Dec., 1921	729	4.4	38.49	
Nina ...	Shorthorn ..	11 Nov. "	871	3.8	36.34	
Sweet Meadows ...	Jersey ...	31 Oct. "	528	5.7	36.11	
College Meadow Sweet	Holstein ...	17 May "	627	4.8	36.11	
Yarraview Snow-drop	Guernsey ...	14 Oct. "	620	4.8	35.71	
Miss Betty ...	Jersey ...	7 July "	704	4.2	35.48	
Miss Security ...	Ayrshire ..	20 Aug. "	1,007	3.1	34.31	
College Prima Donna	Holstein ...	17 Nov. "	932	3.2	32.51	
College Promise ...	Jersey ...	6 Jan., 1922	639	4.2	32.20	
Miss Fearless ...	Ayrshire ...	26 May, 1921	632	4.2	31.85	
Dawn of Warragarburra	Jersey ...	15 Oct., 1920	463	5.5	30.55	
Glow VI. ...	Guernsey ...	28 Aug., 1921	741	3.7	30.46	
Comedienne ...	Jersey ...	26 Nov., 1920	482	5.2	30.07	
College Cobalt ...	" ...	6 Jan., 1921	508	5.0	30.00	
College Sunrise ...	" ...	12 June "	506	4.9	29.40	
College Desire ...	Ayrshire ...	16 Nov. "	529	4.5	28.32	
College Grandeur..	Jersey ...	29 Dec., 1920	443	5.0	26.58	
Lady Annette ...	Ayrshire ...	2 Jan., 1922	884	2.5	26.52	
Fair Lassie ...	" ...	19 Oct., 1921	388	5.2	24.21	
Thornton Fairetta	Jersey ...	15 Mar. "	371	5.4	24.04	
Rosine ...	Ayrshire ...	19 Jan. "	558	3.8	23.71	
Hedges Nattie ...	Holstein ...	26 Feb. "	536	3.9	23.50	
Confidante ...	Ayrshire ...	12 May "	553	3.8	23.28	
Hedges Dutchmaid	Holstein ...	26 May "	520	4.0	23.24	
College Cold Iron	Jersey ...	10 Mar. "	403	4.8	23.04	
Lady Amy ...	Ayrshire ...	27 June "	442	4.5	22.86	
Confidence ...	" ...	8 Feb. "	446	4.2	22.47	
Yarraview Village Belle	Guernsey ...	6 Aug. "	336	5.5	22.17	
Mistress May ...	Ayrshire ...	3 Dec. "	674	3.0	22.06	
Charming Damsel	" ...	12 May "	519	3.8	22.01	
Magnet's Leda ...	Jersey ...	6 Oct., 1920	401	4.4	21.17	

Rainfall, 229 points.

ELECTRICITY FROM WATERWORKS.

An English city has developed quite an interesting scheme for utilizing water power afforded by its reservoirs. It recently extended its waterworks system, and in order to provide electrical power for operating the ropeways, crushers, cranes, and other machinery required in the construction of a dam, it arranged a water turbine installation driven from the existing reservoir. The water, after it has done its work in the turbine and generated its electricity, is returned to the water-supply system. Not only was sufficient power generated for the purposes already mentioned, but enough was produced to light a village and the residences of the staff engaged on the work.

PLASTIC WOOD.

The name "Plastic Wood" is given to an extraordinarily interesting material recently introduced by a British firm. It is made of very fine wood meal mixed with collodion so as to become of the consistency of soft putty. It can be used for filling and stopping holes in wood, as it is exceedingly tenacious and adheres firmly to woods of all qualities. One of its most valuable applications is in the making of patterns for casting purposes. It can be built up into any form and it sets quite hard, so that it can be cut like ordinary wood or turned in the lathe. It has the valuable quality of being waterproof, and it does not warp or deteriorate through damp. Plastic wood can also be finished with sandpaper in the ordinary way, giving a highly glazed finish. Nails can be driven firmly into it without cracking it. Perhaps the only drawback is that its adhesive qualities are so marked that it sticks on the hands of anyone using it. The manufacturers, however, supply a special solvent which enables it to be thoroughly cleaned off the hands.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 9.

WHITE MYRTLE (*Rhodamnia argentea*).

Derivation.—*Rhodamnia*, from Greek *rhodamnos*, a young branch (probably alluding to the slender branchlets of the first species so named; *argentea*, Latin, silvery (referring to the silvery under-surface of the leaves).

Description.—A tree attaining a height of 100 ft. and a barrel diameter of nearly 3 ft. Barrel often channelled and slightly flanged at the base. Bark reddish-brown or grey, finely fissured; often flakey in the channels of the barrel; when cut, dark brown, varying from $\frac{1}{8}$ to $\frac{1}{4}$ in. thick on a tree with a barrel diameter of 2 ft. 9 in. Sapwood pale-brown to yellow. Young shoots and underside of leaves covered by a more or less dense, white, silvery, powder-like fluff. Leaf stalks $\frac{1}{6}$ to $\frac{1}{3}$ in. long. Leaves opposite, egg-shaped, lance-shaped, or elliptical in outline, tapering, or sometimes nearly rounded at the base, blunt or protracted into a long point at the apex, the midrib and a curved lateral nerve on each side of it prominent on both surfaces; the nerves diverging from the midrib and the net veins are more conspicuous on the under-surface. Measurement of leaf-blade 2 to $3\frac{1}{2}$ in. long, two to three times as long as broad. Flowers in small bunches (cymes) in the forks of the leaves, two to four stalks springing from each fork; each stalk measures from $\frac{1}{4}$ to $\frac{1}{2}$ in. long and bears three flowers, the central one of which is sometimes without a stalklet, whilst the flower on each side has a stalklet about $\frac{1}{8}$ in. long. The lowermost part of the flower (the calyx) is about $\frac{3}{16}$ in. in diameter; its lower part is cup-shaped, and its upper part divided into four oval lobes about $\frac{1}{10}$ in. long. Alternating with the calyx lobes are four white, broadly oval petals about $\frac{1}{2}$ in. long. On the inside of the petals are numerous (over twenty) bristle-like stamens about $\frac{1}{6}$ in. long. The ovary fills the cup-shaped part of the calyx, with which it is united, and tapers into a slender style about $\frac{1}{4}$ in. long. Fruit globular, black, about $\frac{1}{2}$ in. in diameter, the outer fleshy part enclosing one, two, or more hard, smooth, yellowish seeds.

Flowering period irregular.

Distribution.—Confined to Australia. Coastal scrubs from the Clarence River to Baffle Creek (north of Bundaberg); National Park; ranges about Killarney and Blackall Range.

Uses.—The timber should be useful for general building work, indoor fittings, and cabinet-making. Mr. R. T. Baker, quoting C. W. Chapman, states that it could be used for carriage, wagon, and wheelwrights' work, boot lasts, gun stocks, and golf clubs. He also states that it could be tried for woodworking planes.

References.—*Rhodamnia argentea*, Bentham, "Flora Australiensis," vol. III., p. 278; F. M. Bailey, "Queensland Flora," part II., p. 653.



Photo. by the Authors.]

PLATE 32.—THE WHITE MYRTLE (*Rhodamnia argentea*), Ranges eastward of Emu Vale, Killarney District.

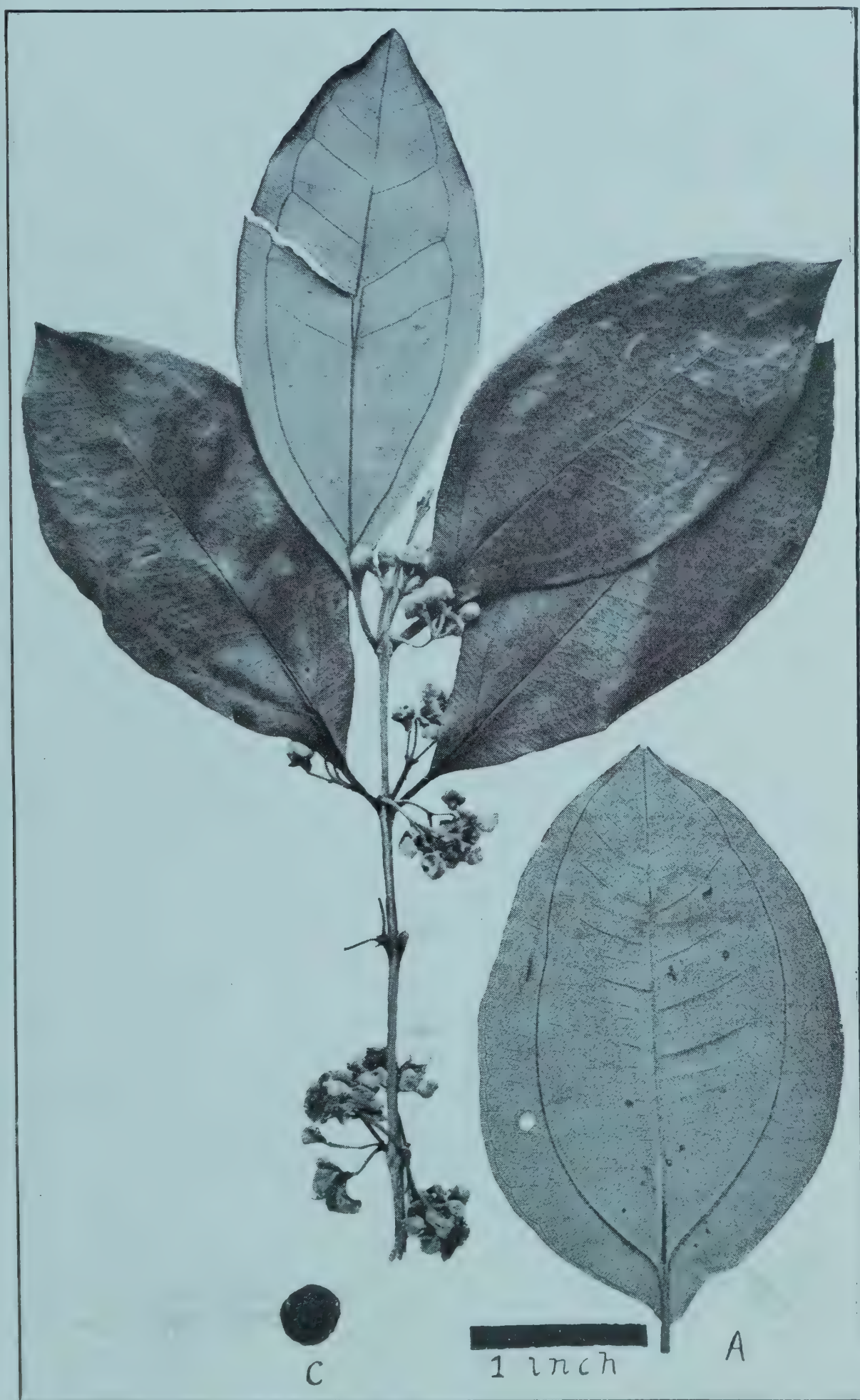


PLATE 33.—WHITE MYRTLE (*Rhodamnia argentea*).
A. and B.—Underside and variation in shape of leaves. C.—Fruit.

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.*BROWNEA GRANDICEPS.*

NATURAL ORDER LEGUMINOSÆ.

By E. W. BICK, Curator, Brisbane Botanic Gardens.

Derivation.—From “Botanical Magazine,” 4859 (1845):—“*Brownea* named in honour of Dr. Patrick Browne, M.D., of County Mayo, Ireland (born 1720), practised medicine in London for a time, and afterwards in the West Indies (first in Antigua, and then in Jamaica), was a correspondent of Linnæus, and keenly interested in Botany; did a lot of collecting; published his valuable ‘Civil and Natural History of Jamaica’ in 1756. *Grandiceps*, large-headed.”

Description.—A tree, said to grow 60 ft. high in its native habitat (Nicholson’s “Dictionary of Gardening,” vol. I., 215). In the Gardens it is a large spreading shrub about 25 ft. in diameter and about 16 ft. high, forming no trunk of any height, the branches commencing within a few inches of the ground.

Leaves.—Large, from 9 to 18 in. in length, drooping, alternate, abruptly pinnate; pinnae from nine to fourteen pairs, from 3 to 5 in. long, upon very short petiolules, and extending the whole length of the very downy ferruginous petiole; they are alternate, oblong, lanceolate, entire, obtuse at base, sharply acuminate; lower pinnae cordate, with a narrow point fully half the entire length. The new growth at ends of branches, usually of eight or nine leaves, is drooping and flaccid, of a delicate pale-green colour, mottled with light-brown splashings; the latter disappears as the leaves harden, the general appearance of the new growth being somewhat like that of long racemes of flowers.

Flowers.—Large, rosy-red, exceedingly numerous, forming a dense pendant globe; the flowers open from centre, and the older ones on outside fall off; the globe or “head” of flowers is from 6 to 8 in. across, and forms at the downy apex of a branch, usually underneath; well-sheltered with foliage. Individual flowers: Calyx funnel-shaped, in three portions, upper segment longer and deeply two-lobed; petals large, spathulate, lamina obovate, waved claws slender; stamens arising from tube of calyx, as long, or rather longer than the petal; anthers linear, versatile; ovary stipitate, springing from the tube of calyx, linear, oblong, downy; style slender, awl-shaped, exceeding the petals or stamens in length; stigma capitate.

Legumen (Pod).—From 3 to 6 in. long, up to 1½ in. in breadth, covered with a dense, rusty, brown down, containing from one to three large seeds varying very much in size and shape, some being oblong, others elongated heart-shape, from 1 to 2 in. long and 1 to 1½ in breadth when freshly gathered.

Habitat.—Venezuela, in the mountain regions of Cumanna, Caraccas, and others where it is known amongst the inhabitants as “*Rosa Del Monte*” (Rose of the Mountains).

Propagation.—From seed (unfortunately our specimen does not seed freely); comparatively few pods form; the seeds germinate readily, and the young plants grow quickly. It being very spreading in growth, an old plant covers a large area of ground.

There is a large plant in the Botanic Gardens, between the centre island pond and the main riverside roadway. It flowers for several months in the year, usually in August, September, and October, and the magnificent, unique heads of brilliant flowers attract universal attention.

There are a number of other species of this fine Genus, all of which are indigenous in South American countries, of which *Brownea coccinea* is the only other species represented in the Gardens. We are endeavouring to obtain seeds of some of the others that are very interesting and beautiful.



PLATE 34.—“*BROWNIA GRANDICEPS*.”
1.—Flower Spike. 2.—Seed Pod and Seeds.

SHEEP ON THE COAST.

By W. G. BROWN, Sheep and Wool Expert.

The old and cherished theory that sheep will not thrive on the coast is gradually being worn down by the success of men who have backed their opinion in a practical try-out. From time to time reports reach us of the successful establishment of small flocks on various parts of the coast, and even on adjacent islands; and the evidence supports the contention that, under right conditions and capable management, sheep of suitable breeds will not only do well but will prove a very profitable side line to general farming in seaboard areas.—ED.

A decided acquisition to the farmers' flocks of Queensland is the one recently established by Mr. Hugh McMartin at Glen Pullen, Pullen Vale, near Indooroopilly. Mr. McMartin has had a long experience among sheep. Prior to going on service with the A.I.F. he was engaged on a grazing venture on the Northern Downs. After discharge from the army he was attracted by the prospect of success in the establishment of a stud nearer the coast, and, after full inquiry, planned accordingly. After travelling up and down the State, he fixed upon Glen Pullen as a property most suited to his purpose. The holding comprises about 500 acres, and is situated within 10 miles of the Brisbane G.P.O. and 7 miles from Indooroopilly. Although but partly improved, enough has been done to show that in time it will become a snug little property, ideally adapted to sheep-farming. The country for the most part is undulating, and the cleared and rung areas are well covered with natural and exotic pastures. Though mostly forest land, there are fairly extensive patches of rich vine scrub, and the valley bottoms contain some excellent arable areas already abundantly productive. Permanent water is provided in creeks and springs.

Mr. McMartin made a start with a small flock of crossbred ewes headed by a purebred Border Leicester ram, and these are doing well. Within the last few months a flock of Dorset Horn ewes and a ram of the same breed (imports from a well-known South Australian stud) have been added. Inspection showed that these sheep are of very great excellence, and since their coming to Queensland they have improved remarkably.

The two flocks are kept apart and are being fed—the first on natural grasses, and the Dorsets partly on indigenous pasture and partly on introduced grasses and cultivated fodders.

The accompanying plate gives some idea of the quality of Mr. McMartin's Dorset Horns and of the country upon which they are running.

CHARACTERISTICS OF THE DORSET HORN.

“Both male and females have horns, those on the males curving backward and around spirally, while those on the ewes curve outward, down, and forward, with tips rising about level with the eye, perhaps turning in slightly. The face, legs, and hoofs are white. The nostrils are also white; face strong, with considerable breadth between the eyes. Compared with the ideal mutton sheep, the neck and body tend to be long and rangy, and there is hardly the spring of rib and levelness of back most desirable. The head should have a short foretop of wool; the back part of the head below the ear should be woolled; and the body generally should be well covered with a fine fleece, extending down to the knees and hocks. The breed is from medium to heavy among the middle-wool breeds. Rams in fair flesh should weigh about 225 lb., and ewes 165 lb.; however, much larger weights are secured.”—“*Types and Breeds*” (Plumb).

The foregoing gives an idea of what to look for. The weights given have been exceeded by as much as 100 lb.

Excellent results have been obtained by numerous crossing experiments with the Merino. The cross produces ideal spring lambs much sought after by butchers. Dorsets shear about 9 lb. for rams and 6 lb. for ewes. The quality of the staple is of medium grade, being neither fine nor coarse.

THE SUCCESSFUL MOTOR LORRY.

One of the reasons for the pre-eminence of British motor wagons is that open competitions are held between the different makers every year. A trophy is awarded annually for the most successful performance in any certified trial for a total distance of over 1,000 miles. The successful vehicle at the last trial gave an average running speed of nearly 16 miles per hour, with a consumption of motor spirit of 13 miles to the gallon. The lorry was fully loaded, its total running weight being 5 tons 6½ cwt. The oil consumption worked out at 504 miles per gallon, and throughout the whole of the ten days' trial no adjustments were effected except the cleaning of a choked petrol cock.



PLATE 35.—DORSET HORN SHEEP ON MR. HUGH McMARTIN'S PROPERTY, "GLEN PULLEN," PULLEN VALE.

NEW TYPE OF CONCRETE ROAD.

Concrete roads have become quite familiar in many parts of the world, especially where highways capable of carrying very heavy traffic are required. The making of a satisfactory concrete road is, however, a matter of great skill; and in many cases disappointing results have been achieved. One of the drawbacks of concrete as a road material is that it contracts to a certain extent in setting and also as the temperature falls. Again, when concrete of the usual kind is laid in position, the scum always works to the surface and forms a layer which, when dry, prevents a proper junction being made between different portions of the roadway. The consequence is that cracks appear in the roadway, especially at places where the laying of the concrete has been arrested, as in the case of the end of a day's work. A British road engineer has developed a new method which he claims obviates these difficulties. He lays the concrete in alternate portions and does not fill the intervening spaces until the material in the first portions has set and contracted. Further, he makes the edges of each portion exactly vertical by means of special appliances. This ingenious method results in the roadway being split up into straight, close joints instead of a number of irregular cracks.

COMMERCIAL FRUIT PACKING.

For a considerable time past the Department of Agriculture has been striving, through the Journal and other media, to impress Queensland fruitgrowers with the necessity of the utmost efficiency in picking and packing their products. An awakened public opinion among orchardists on the Granite Belt led to the expression of a strong desire for instruction in improved methods, and this was met by the State Government with an arrangement with the Tasmanian Ministry of Agriculture for the loan of the services of an expert packer. In placing the time and experience of Mr. W. Rowlands, a valued departmental officer, at the disposal of Queensland growers, the Tasmanian Government acted generously, for among the orchardists of the island State there is a constant demand for the expert packers' knowledge and assistance. Mr. Rowlands' tour of duty was limited to one month in the Stanthorpe district, and the growers on the Granite Belt made the most of his visit. An immediate result of his instruction was a notable improvement in Stanthorpe consignments received at Roma Street, and a consequent improvement in prices.

Though a much longer period of instruction was desired, it was only possible to secure the services of the expert for the month of January. Full use, however, was made of the time allotted, and altogether thirty-seven public demonstrations were given. The localities covered were Eukey, Glen Aplin, Ballandean, Bald Mountain, Beverley, Broadwater, Applethorpe, The Summit, Thulimbah, Cotton Vale, Pozieres, Bapaume, Amiens, Dalveen, Stanthorpe, Wyerba, Dalcouth, and Kyoomba.

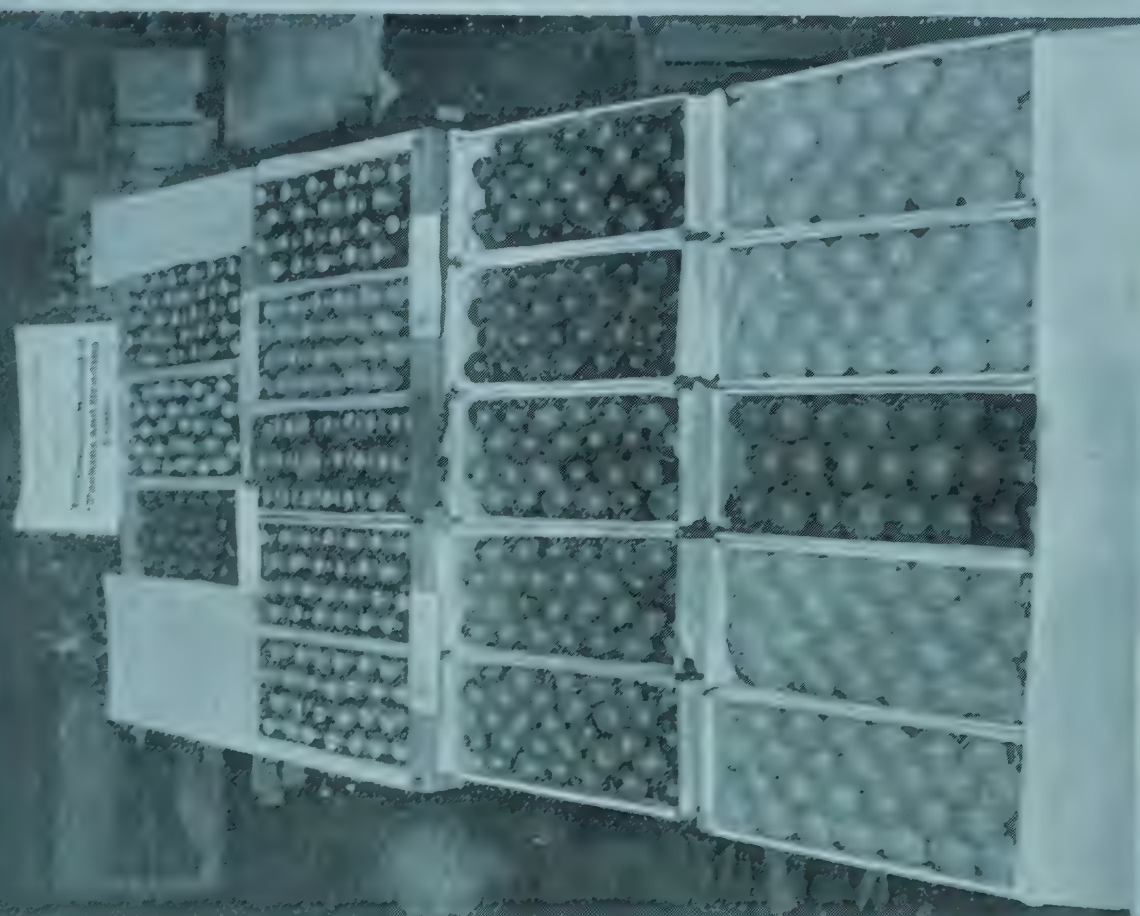
Attendances were particularly good, growers generally evincing the keenest interest in the demonstrations. Methods hitherto in vogue were, in many instances, somewhat slack and antiquated, and a result directly traceable to the instruction of the demonstrator is the checking of a tendency to disregard modern market requirements. On the other hand, orchardists who are most careful in picking and packing received an appreciable stimulus. It is interesting to note that Stanthorpe growers, who have in the past recognised the selling force of sound, well-packed products of good quality, are among the more prosperous. It is an axiom in Roma Street that any fruit of desirable variety, well grown, carefully handled, properly graded and packed, is more than half sold. Fruits and primary products generally are sold on the farm. Good fruit, honestly and carefully packed, will sell in any market. Slack packing and "topping" kills the grower's reputation. The markets are rarely glutted with first-grade fruits. Both dealers and consumers want the best.

A full description of Mr. Rowlands' methods, as adopted by the Tasmanian Government and adapted to Queensland conditions, together with appropriate illustrations, will be published in the Journal as soon as the letterpress comes to hand. It will be subsequently printed for distribution in pamphlet form.

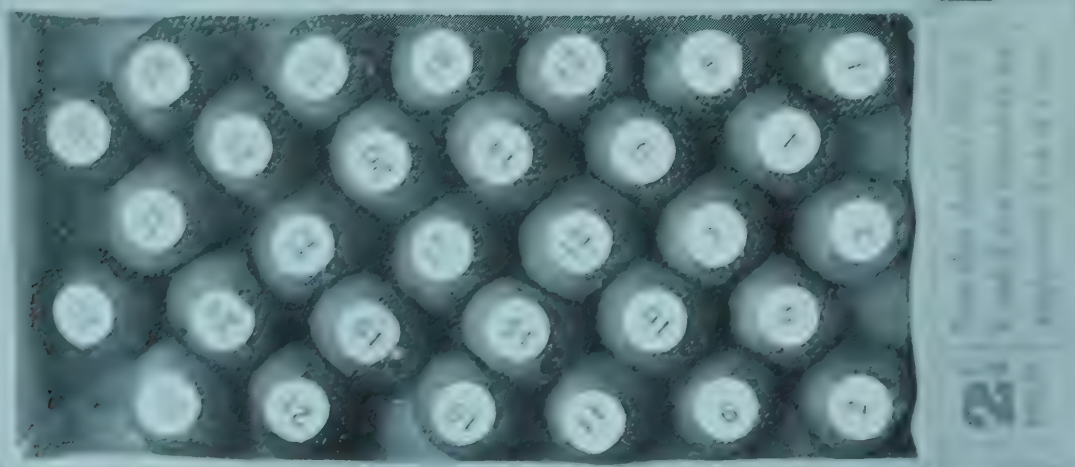
One illustration shows trays of apples packed by the Tasmanian expert for exhibition at the recent Stanthorpe show.



3. THE 2-2 PACK.



1. DISPLAY OF FRUIT PACKED BY MR. ROWLANDS, EXHIBITED AT THE STANTHORPE SHOW.



2. THE 3-2 PACK.

STANTHORPE JUBILEE SHOW.

The actual initiation of fruitgrowing in the Stanthorpe District is shrouded in obscurity, but the pioneers who in the beginning obeyed the behest to establish a new industry builded better than they knew. To-day Stanthorpe, in its jubilee year, stands as a monument to the faith and character of its founders. Like some other Queensland towns, it enjoyed a transitory mining boom and suffered a temporary decline. But there were men in the district who knew that more wealth was to be won from the disintegrated granite beneath their feet than from stream and reef, and on that knowledge is built the prosperity of to-day. And with the complete emergence of man's oldest industry from the primitive to the scientific, it requires but little imagination to see Stanthorpe celebrating her centenary as a city centre, with well-constructed roads radiating to the limits of the Granite Belt, and providing every amenity that enriches rural life.

THE OPENING.

The Stanthorpe Jubilee Show was opened on 2nd February by His Excellency the Governor, Sir Matthew Nathan, who, in the course of his remarks, said:—

“This is the second year in succession that I have had the pleasure of opening your Show, and the occasion has afforded me an opportunity of seeing the advance made in the main industry of the district during the year. When I was here last



PLATE 37.—HIS EXCELLENCY SIR MATTHEW NATHAN OPENING THE STANTHORPE JUBILEE SHOW, 2ND FEBRUARY, 1922.

year it was at a period of glut in the fruit market. A Stanthorpe Co-operative Canning, Jam, and Preserving Company had started pulping about a month previously, satisfactory manufacture suffering somewhat from the desire to save as much as possible of the fruit that ripened in the short season from the middle of December to the end of the first week in March. At Amiens, the Pikedale Soldiers' Settlement Canning, Jam, and Preserving Company were about to begin work by pulping tomatoes with a view to subsequent manufacture of soups, as well as of sauces and other condiments. The Broadwater Co-operative Packing Company, who were at work in grading and packing peaches and other products, were finding it difficult

to get a market for the fruit. At the end of the season it was estimated that about half the fruit grown in the district had been wasted. There had evidently been want of organisation, and the decision was discussed locally that the various co-operative companies in the Granite Belt should be amalgamated under one head.



PLATE 38.—CANNING ON THE ORCHARD. HIS EXCELLENCY THE GOVERNOR INSPECTING MR. T. J. BALLENGER'S HOME CANNING PLANT AT "GARTHORNE," STANTHORPE.

As to how far this has been done, how far complete co-ordination has taken the place of competitive co-operation, I am not quite clear, but I gather that you are on the way to this, and that there is a Stanthorpe Fruit Growers' Council that is looking after the general questions affecting the fruit of this district and co-operating



PLATE 39.—SUN-DRYING FRUIT AT "GARTHORNE," STANTHORPE.

with the Southern Queensland Fruit Growers' Society in securing a wider distribution of the deciduous fruit grown in the district. The special fruit train that has been run from Wallangarra to Brisbane under the auspices of this society since the middle of December has, no doubt, improved the conditions under which fruit has been put on the Brisbane market, but probably this year is distinguished from last not so much by improvement in organisation as by the fact that the fruit crop is light in quantity and good in quality, and so more easily marketed. I think, however, from what I have read, that the growers in the Belt are realising that against the time of large crops of fruit of mixed quality they must solve the two great problems of standardisation and distribution. I notice that when speaking a short time ago at the meeting of the Southern Queensland Fruitgrowers' Society, the chairman stated that during a trip from Newcastle he had interviewed numerous fruit merchants in the various towns on the line and that they had all expressed a desire to do business direct with the farmer, but that they must be able to rely on a standard quality and pack. He added that he had seen fruit in the shops that should never have left the farm, and that in very few instances was the fruit graded or packed properly. 'Fruitgrowers had reached the end of things under present conditions; it was life and death to the industry.' I suppose standardisation would mean that all deciduous fruit of the Granite Belt would go through a single packing-shed, and no doubt that subject is receiving the attention of the Stanthorpe Fruit Growers' Council. It would appear, from what I have been reading, that consideration is also being given to the problem of distribution. One element of that problem is the form in which the distribution of the produce should take place. New experiments are being carried out by the Commonwealth Government, though I cannot find that Queensland is taking part in them, with regard to shipment in cold storage overseas. The Queensland Government is giving facilities to the Southern Queensland Fruit Growers' Society for cold storage experiments, and it may be found advisable to have a cold store here to preserve some of the fruit—apples particularly—which ripen in the summer months, for distribution during the rest of the year.



PLATE 40.—QUEENSLAND CO-OPERATIVE FRUIT PRODUCTS COMPANY'S DEHYDRATOR, GLEN APLIN, STANTHORPE DISTRICT.

"Then, again, various dehydration plants are on trial, including the one at Glen Aplin, put up by the Queensland Co-operative Fruit Products Company, Limited. The gist, however, of the distribution problem can scarcely be better put than in a letter which appeared in the Press a short time ago from a fruitgrower of Manly. He said this:—'The real problem which fruit farmers and planters have to face is not one of treatment so much as one of highly organised marketing. In this respect the American, of California, can show points to the whole world. Whether the fruit products be fresh, canned, or dehydrated, they are selected with the utmost

care, graded with scientific exactness, packed excellently, and then, with agents of ripe judgment in every quarter of the globe, he is advised daily by wire and cable, and places his fruits in markets where there is a scarcity, thus avoiding a glut. The fruit farmer should not pin his faith to any one method of disposing of his produce, but adopt all.' The main question then for the growers in the Granite Belt is how to organise their marketing. This problem is worth the consideration which I am sure it will receive from the best brains in this district."



PLATE 41.—A FRUIT EXHIBIT, STANTHORPE JUBILEE SHOW, 1922.



PLATE 42.—“HOUSEWIFE'S CUPBOARD,” STANTHORPE JUBILEE SHOW, 1922.

THE FRUIT EXHIBITS.

The extensive collection of deciduous fruits was magnificent, and in the fruit section generally no fewer than 634 entries were received. The most striking feature of the display was the large number of cased exhibits showing a very high standard of selection and packing. A close and critical inspection made it very evident that the Granite Belt has nothing to fear from Southern competition. The Plate classes were also of outstanding quality. So good were the fruit exhibits generally that it became a matter for marvel that no local organisation has taken up the question of a constant supply of superior fruit to local hotels and railway stations. These provide means of advertisement of district products that cannot be disregarded.

RETURNED SOLDIERS' DISPLAY.

The Pikedale Returned Sailors and Soldiers' Co-operative Canning Company made a very attractive display of the products of their factory. The "Aussie Tomato Soup" label was prominent, and this is covering an excellent product.



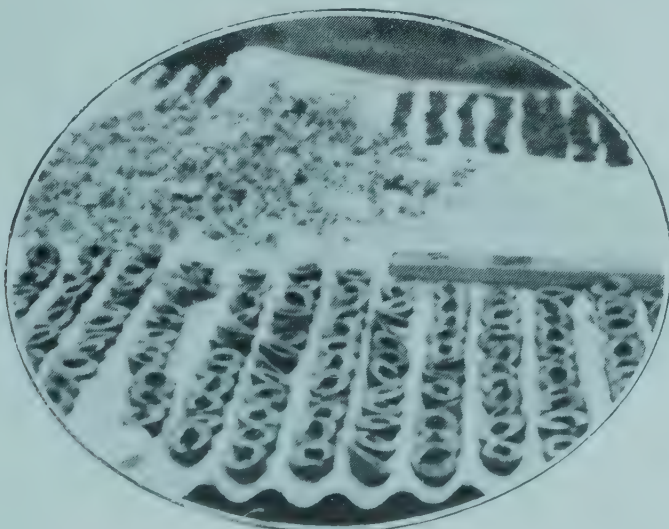
PLATE 43.—DISPLAY OF PRODUCTS OF THE PIKEDALE RETURNED SAILORS AND SOLDIERS' CO-OPERATIVE CANNING CO., LIMITED, STANTHORPE JUBILEE SHOW, 1922.

The plant at Pikedale is small but efficient, and the process of treating tomatoes is simple and comparatively inexpensive. The tomatoes are first put through a pulping machine, which tears them into shreds, and the pulp is then run into 60-gallon steam-jacketed pans. An important feature of the processing is that absolutely no water is added to the pulp in the whole course of the operations. After boiling, the soup goes through another machine, which eliminates seeds and skins, leaving the pure product ready for canning.

In other displays of art and industry the returned men were well represented among the prize winners.

OTHER EXHIBITS.

The other exhibits at least equalled, if not surpassed, the standard attained at previous shows. An example of the right methods of grading and packing, as demonstrated by Mr. Rowlands, the Tasmanian expert, is described and illustrated elsewhere.



SUN-DRYING FRUIT AT STANTHORPE.

A SHORT REVIEW OF THE SUGAR INDUSTRY IN QUEENSLAND FROM 1914.

By H. T. EASTERBY, General Superintendent, Sugar Experiment Stations.

Considering the vast importance of the Queensland sugar industry to Australia as a whole in developing and settling the North, it is difficult to understand the hostile attitude adopted by the Southern Press. The idea present in many Southern minds is that sugar-growing is a highly prosperous industry in which "large planters" make enormous profits, this being a kind of tradition that has descended from other countries and other times, even though many of the old planters had, at times, to meet low prices and other hardships. As a matter of fact, sugar-growing is carried on in Queensland by a large number of small farmers, many of whom have a hard struggle to get on. For many years past the cane farmer has had unceasingly to struggle against the high cost of production, increasing wages, insect pests, cyclones, and enhanced prices for all the goods he uses. It is willingly admitted that since the date of the last agreement between the Federal and State authorities, whereby the price of sugar was increased to £30 5s. 8d. per ton, the growers have been in a much better position, but it is almost always overlooked that from 1914 onwards through the war period, they were supplying sugar at a very low price compared with what was being obtained in other countries in the world. When an application was made in 1914 to the Interstate Commission for consideration, it was postponed on the grounds that the war was sufficient protection in itself, and they stated "that the sugar-growers would have the market of Australia entirely to themselves for the next two years." This was poor consolation to the sugar-grower at a time when sugar values in all parts of the world but Australia were increasing rapidly. As a matter of fact, the price in Australia in 1914 was £1 per ton less than in the year before. No benefit, therefore, came to the Australian sugar-producer, either from the effects of the war on the European crops of beet sugar or from the fact that he did have the Australian market all to himself. The action of the Southern Control of Prices Boards in 1914 in holding down the price of sugar led to many of the mills making an absolute loss on the season's operations, and prevented the cane farmer from obtaining that increase in payment for his cane to which he was justly entitled. It was a position directly antagonistic to the white labour policy of this country, and the national view of settling the northern littoral by means of the sugar industry for defence purposes. Fortunately, some small measure of relief was afforded by an agreement between the Queensland State Government and the Commonwealth, in 1915, whereby the price of sugar was fixed at £18 per ton. This price was nothing like what was hoped for, and the industry in 1915 was further handicapped by a terrible drought, which did immense damage in a number of sugar districts, and proved a further setback to growers.

The price during 1916 remained at £18, but this was a bad year for growers and millers, also being famous in sugar circles as the "Dickson Award" year, when some mills did not crush at all, and others did not commence till very late in the season. This meant great loss to growers and the standing-over of large quantities of cane to the 1917 season. In 1917 the price of raw sugar was raised to £21 per ton by agreement, which was still too low a price, taking into consideration the high prices ruling in other parts of the world. The Queensland sugar-producer, however, never pressed for the outside price of sugar. He did not wish to penalise the country; all he desired and hoped for was fair treatment. At the commencement of the 1917 season conditions appeared favourable for the harvesting of a record crop; and, while this was ultimately realised, yet the estimated output was finally reduced considerably. This was due to two causes:—

First.—The industrial strife in the Southern States, which held up regular supplies of bags and lime to the mills and prevented the sending of ships for the conveying of sugar to the refiners. The district of Mackay suffered most particularly, and the mills of that locality had to close completely on two occasions for several days for lack of sugar-bags, which had the effect of disorganising labour and causing a considerable number of men to leave the district. Due to the non-moving of the sugar, every wharf and store was congested. Many of the mills were obliged to add to their storage accommodation at a time when galvanised iron was almost unprocureable and both it and timber were at a very high price. Some of the Northern mills were obliged to store sugar within the mill itself, and the loss that ensued from all this double handling, payments for insurance and storage, and the deterioration of the accumulated stocks of sugar, was very high. On the Lower Burdekin, owing to lateness in starting, closing-up during the Northern railway dispute, and stoppage for want of sugar-bags, there was a large amount of cane unharvested.

Second.—The 1918 cyclones, which at Mackay caused the loss of over 6,000 tons of sugar, washed away from the sugar stores at mills and wharves in the floods and heavy rains.

These two factors materially reduced the 1917 crop, though it was still a record, but a good deal of the loss, mostly that in connection with the sugar spoilt by the floods, was borne by the Federal Government, which relieved the situation to a large extent.

In 1918 the price still remained at £21 per ton. That year two appalling cyclones struck the Queensland coast in the sugar districts. The severity of those cyclones not only caused immense damage at Mackay, Innisfail, and Babinda in particular, but seemed to affect the cane more or less in all the sugar districts. In addition to this, rain, floods, and frosts played their part in reducing the 1918 crop. These two cyclones inflicted enormous losses on sugar-growers, not alone in the terrific damage done to cane, but in the loss of life, destruction of houses, stables, and out-buildings, the whole work of years in many cases being swept away in the course of a few hours. The terrific rainfall which fell at Mackay during the three days after the cyclone amounted to 55½ inches, and did irreparable damage to household goods. The courage displayed by the people of Mackay, Innisfail, and Babinda was wonderful, but was characteristic of the inhabitants of North Queensland, whom no cataclysm of Nature seems able to terrify. How little is known in the Southern States of the trying experiences which the sugar-farmer has to undergo in order to make a living and fill the sugar-bowls of Australia! His fight with the tropical jungle in the fierce heat of a humid summer in the endeavour to clear a space for canegrowing and build a simple home is never considered by the city dweller, who has every comfort at his command.

After the abnormal rainfall in the early part of the year, the end of the year proved very dry.

During the year 1919, the sugar-consumers continued to get their sugar at very much lower rates than in any other country, but even then there was an agitation amongst the jam manufacturers for cheap sugar. As the "International Sugar Journal" reminded them, they were getting their sugar "dirt cheap." The agreement with the Commonwealth Government for the sale of raw sugar at £21 per ton terminated that year. The drought which commenced towards the end of 1918 continued into 1919, and adversely affected the crop, the yield of sugar being poor, and amounting to only 162,136 tons.

The year 1920 saw the dawn of a brighter era. The continual upward tendency of the world's market price for sugar became so great that at last it was generally recognised, as it should have been previously, that the sugar-growers were being treated unfairly. Steps were taken by a conference, which was held at the Department of Agriculture, to wait upon the Prime Minister of the Commonwealth and request that the price of raw sugar should be increased from £21 to £30 6s. 8d. per ton, and that an agreement to that effect should be made for a period of not less than three years. This was finally given effect to, and it immediately gave an impetus to the production for next year. Encouraged by the better outlook, farmers in almost every sugar district increased their areas, not only putting under cane, land that had been lying unproductive, but in many instances bringing new land under cultivation.

The more favourable rates for sugar did not come any too soon, as the price of all commodities which the sugar-grower uses had increased by leaps and bounds. Fertilizers, green manures, implements, and cost of living were all on a very high plane, and the latter has, of course, affected the wages of the labourer, so that the sugar-producer was often hard put to it to make ends meet. Compared with the prices that were obtained for sugar in outside countries, the price paid by Australia was very low.

The drought experienced in 1919 persisted into 1920, and the crop was again a poor one, though slightly better than in the previous year. The amount of sugar produced amounted to 167,401 tons. The new lands mentioned above as having been put under cane were, of course, not productive for that season. Hence the enhanced price received for 1920 did not benefit the industry to the extent hoped for, owing to short crops.

Coming now to the last twelve months, we may say that the sugar industry during that period has enjoyed a greater measure of prosperity than it has for many years past, and has made it apparent that if the industry is to be stabilised a fair price must be ensured.

While the price for sugar and cane is uncertain, growers will not risk putting in increased areas, nor can millers afford to bring their mills up to date and increase their efficiency. The effect of a guaranteed price for three years was immediately apparent. Farmers in nearly every district commenced putting new areas under

cane, using in many cases land that had been lying unproductive for years. The millers had their plants overhauled, and put in much-needed improvements, in many cases increasing the capacity of their mills. Improved railway communication also assisted matters; and new districts (such as Carmilla, near Mackay, and the Maria Creek Soldiers' Settlement, south of Innisfail) have been added to existing mills.

The present prosperity of the industry, however, did not come before it was needed. Due to the increased prices for all commodities and the high price of labour, farmers for some years prior to 1920 were unable to carry out the improvement of their land by better methods of cultivation and the use of fertilizers; and it may be added that a large number of our cane farmers were indebted to storekeepers, banks, and mills for financial aid. The present year, however, will see a great deal of this indebtedness wiped off, and a big advance in cultivation and the use of fertilizers has already taken place. It may be safely said that more fertilizers have been purchased this year than ever before in the history of the industry. It has been the aim of the Queensland growers to endeavour to keep Australia supplied with sugar, and as long as a fair price is offered, the industry will continue to do so.

The rich tropical belt of fine land comprised in the Banyan and Tully areas, between Cardwell and Innisfail, urgently needs developing by the erection of one or more large mills, and the sooner this can be accomplished the better. We require a great population in North Queensland along the coast to effectively settle and defend it, if need be; and the more population we have there, the more will the back country be settled and developed. It has been recently stated in connection with the last census that the increase in the population of the Herbert Electoral Division, which embraces the comparatively newly settled areas of Babinda and South Johnstone, was 19.4 per cent., or 14,929 persons—a greater increase numerically than in any other part of Queensland. This shows what can be done.

From the above review of the industry since 1914 it will be seen that the sugar-grower has had to struggle against a number of disadvantages, and that the Australian consumer profited at his expense for many years in obtaining cheap sugar, while all the rest of the world were paying enormous prices, up to 1s. 6d. per lb. It was always anticipated that owing to this fact and that the sugar-producer never asked for the world's parity during the war, they would be able to expect fair and just treatment from the Commonwealth of Australia. The present agreement only covers the coming crop, and the grower is at present again uncertain of what is going to happen. The highest need in the sugar industry is stability. Let us once secure that, and the expansion and success of sugar-production will become a certainty. New areas of land will continue to be put under cane; new mills will be erected, and the northern littoral of Queensland will become populated with a thriving community. If Australia is going to keep the sugar industry for the white race, it must be prepared to pay such a price for sugar as will enable this to be done. As the first Federal Royal Commission on the Sugar Industry said, "A white community which prefers to grow its own sugar in its own territory with white labour must face the responsibility of making good the increased cost of production under the higher standard of living and reward. Either the consumer or the taxpayer must pay." Australia is the only place in the world where cane sugar is being produced by white labour. We are in competition with countries which produce sugar by black labour and under black-labour conditions. Without protection, it will be quite impossible for the Australian industry to survive.

Finally, I would bring this paper to an end by quoting the words of the first Royal Commission:—

"The problem of the sugar industry to-day is not, save in subordinate respects, a problem of industry, of wealth, or of production; it is primarily and essentially a problem of settlement and defence. No nation can afford to regard lightly the development of its industries, the progress of its wealth, or the economic efficiency of its productive machinery. But, important as these things undoubtedly are, they rank, as regards the sugar industry, on an inferior plane. The Commonwealth to-day is brought face to face with one of the gravest problems that has ever taxed the ingenuity of statesmanship—that of the settlement of tropical and semi-tropical areas by a white population living under standard conditions of life. And intimately associated with this problem is the question of national defence.

"If the ideal of a White Australia is to become an enduring actuality, some means must be discovered of establishing industries within the tropical regions. So long as these regions are unoccupied, they are an invitation to invasion, as well as a source of strategic weakness. Granted so much, it follows that the supreme justification for the protection of the sugar industry is the part that the industry has contributed, and will, as we hope, continue

to contribute to the problems of the settlement and defence of the northern portion of the Australian continent. The recognition of the nature of this supreme justification is the first condition of a sound public policy in relation to the sugar industry. Relatively to it, all other issues are of minor importance."

This statement as to defence has been justified by the fact that one in eight of the entire population of Mackay enlisted to defend our country; over 3,000 enlisted in Bundaberg—a similar proportion; and about the same proportion in Cairns. Had the rest of Australia enlisted in the same ratio, we should have had over half a million men.

SUGAR : FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports under date, 7th February, 1922, as follows:—

"*Bundaberg*.—Remarkable growth is in evidence on all the Bundaberg cane farms, more especially on the highlands south of The Hummock. On the Woongarra area the farms are looking their best, and growers are expecting a heavy crop for next year. In anticipation of this, it is likely that the mills will start operations early in the season. Assuming that this will be so, much of the cane will have to be harvested at an unripe stage, as very few of the varieties attain their maximum c.e.s. values before the 20th of September. The question of introducing the early maturing cane (H.Q.285) should therefore be considered.

"Mr. R. Nielson, on the Sandhills road, has a fine crop of this variety to harvest next year, and growers interested should look at this cane growing under field conditions.

"Now that the soil is in good condition, with plenty of moisture, a good tilth should be kept, so that the capillary moisture may be conserved as the earth dries.

"At Barolin the prospects are sound. More fertilising with concentrated fertilisers is being undertaken than hitherto, and although last winter the frost affected the cane on the low-lying portions, the beneficial results of these operations are noticeable. The best results have been obtained on red forest loams by fertiliser containing a predominance of potash, and by nitrate of soda as a top-dressing for ratoons, to the extent of 1½ cwt. to the acre.

"Good results have periodically been obtained by the Pemberton Estate management through the use of lime and the ploughing-in of maize as a green manure.

"Good results are being obtained from fertilising D.1135 with 3 cwt. per acre of bonedust. What may suit one farmer, however, may not suit another, and the best guide to manuring is local experiment and soil analysis.

"Early spring planting should be adopted as much as possible with quick-growing canes, so that, if frosts occur, the well-grown cane may have greater powers of resistance than young autumn-planted cane.

"At Millbank and on the river generally there is very little poor cane at present. Both the plant and ratoon crops have grown several feet in the last couple of months, and varieties such as H.Q.813, 112, 970, D.1135, M.1900, and H.Q.285, especially the latter, are all giving the growers satisfaction.

"To avoid confusion, growers obtaining canes from the Experiment Station should be careful to place the number of the variety at the end of the row after planting, for future identification. Careful methods of cultivation should be observed from now on through the year, as dry weather may come, and it is essential to keep the land in good condition, with a fine tilth.

"On the Gooburrum side the farmers are making headway. There is still a lot of land in this area suitable for cane. In this respect a number of farmers are seriously thinking of getting more land ready for the plough, and there are about 1,000 acres of swamp at the head of Tantitha Creek which would be excellent for agricultural purposes if cleared and drained.

"Cane pests and parasites are at present causing a minimum of trouble, although beetles are flying plentifully at present. Regarding the latter, one farmer mentioned the efficacy of the bandicoot in destroying grubs. He said they damaged the cane very little, but at one time completely wiped out a bad grub infestation on his farm."

The Northern Field Assistant (Mr. E. H. Osborn) reports under date, 7th February, 1922, as follows:—

“*South Johnstone*.—The early part of January was spent at the Experiment Station here. The great growth in nearly all the cane was most marked. At the time the weather was ideal for canegrowing, as the heavy tropical showers were followed up by intensely hot bursts of sunshine, and any well-cultivated cane was bound to respond. Throughout South Johnstone and Mourilyan some fine cane was noticed, and all growers are busily engaged ratooning, scarifying, and weeding. At South Johnstone some of the Mourilyan farms were visited, and a little time was also spent at the mill. The mill finished crushing just prior to Christmas, after putting through the very good tonnage of 85,744 tons of cane off 4,615 acres, giving a return of 18.5 tons per acre. Of this tonnage 77 per cent. was green and the other 23 per cent. burnt; the density averaged in the vicinity of 13 c.c.s.

“No labour troubles of any kind caused delay, and the cutting rates were said to be very reasonable. The mill officials were very hopeful of a good season for 1922, as the acreage to be cut amounts to 5,010 acres, or practically 400 acres more than last year's, and the cane has been favoured with a good start.

“Probably 90 per cent. of the Mourilyan cane is Badila, the balance being H.Q. 426 and the Gorus 24, 24A, and 24B.

“A good deal of interest is being taken locally in the work of the Experiment Station, and a big demand for new varieties is sure to be made at the next distribution of cane plants. A great deal of interest is also being manifested in the new seedlings at present in the very early nursery stage. Of the eighty-two growers supplying the mill, about 25 per cent. are British; the remainder are represented by a very industrious type of Italians and Spaniards.

“Manuring is being carried on in a far larger proportion than in past years. Liming is such an expensive item in this district that its use so far has been very light, but the growers recognise the advantage of its use.

“The South Johnstone mill finished its season with a total of 120,686 tons of cane from an acreage of 6,697 acres, equalling a yield of 18 tons per acre. Practically 90 per cent of the crop was Badila, the remainder being H.Q. 426 or the Gorus. Of the total tonnage, 54 per cent. was cut green and 46 per cent. burnt.

The prospects for the coming season are bright. The acreage to be cut amounts to 7,204 acres from the South Johnstone mill area (of which 209 are standover) and 450 acres from the Maria Creek Soldiers' Settlement (195 acres of which are also standover), or a total of 7,654 acres in all.

“As most of the cane looks vigorous at the present time, a good crop should be the outcome for 1922.

“The mill management have initiated an active rat-poisoning campaign; and to combat the borers they are arranging with Mr. Jarvis, of the entomological station at Meringa, to free numbers of Tachinid flies in suitable cane areas to cope with the pest. Quite a large number of paddocks were noticed in the Goondi and Mourilyan areas under green manure. In the former area a large number of various makes of tractors were working, and the general satisfaction expressed by the owners at being able to carry on constant work, despite the very hot weather conditions, was marked. Goondi mill finished crushing earlier than either of its neighbours, and 105,000 tons of cane represented its output.

“*Soldiers' Settlement (Maria Creek)*.—Since my last visit in September the North Coast line has been completed from Innisfail to this centre, and in future the railway station at the settlement will be known by the name of ‘El-Arish’ (Palestine Campaign). The linking up of this line has made a vast difference in this place, and travelling down in comparative comfort on the 3 ft. 6 in. line makes one recall the miles of slush called roads that formerly had to be negotiated in the wet season from the end of the 2-ft. line at Silkwood to the present terminus. This only refers to the early part of last year, and as 198 in. of rain fell at the settlement during 1921 it will be easily seen that the roads were very seldom dry. In going around the area, quite a number of new houses were noticed, and I learn that fifty-five settlers are now in occupation of their blocks. The area under cane is now 635 acres, the greater proportion of which should be harvested in 1922. Nothing but Badila has been planted in the area, and generally speaking it looks healthy. Mr. Martin, the supervisor, tells me that the cane has grown comparatively more in the last month or so than in any other period of its growth. Adjacent to the hillside, on the reddish soils, some very fair cane was seen. About the best of this was upon Mr. Willman's block. Mr. Willman has had previous experience growing cane with some of the leading farmers in the Goondi district and has kept his field in an excellent state of cultivation, with the result that a very heavy crop should be harvested. As all the areas are small there is no excuse for dirty cultivation.

“Regarding harvesting operations for the coming season, the Public Estate Improvement Board is making a number of main roads, and the South Johnstone mill is supplying the settlement with 3 miles of rails, to be used for a horse tram, and also a couple of miles of portable rails for the fields, thus connecting the farms with the derricks on the North Coast line.

“*Aloomba*.—A short visit was paid to Aloomba and Gordonvale. At the former place the cane looks healthy, for cultivation and liming are now being carried out. Green manuring the fertilizing have received much attention.

“On Mr. F. Martin’s farm the writer saw one of the best crops of cowpea he has seen for some time. The cane on this farm compares very favourably with any seen in the vicinity, and it says much for the way in which the cane has been carefully cultivated.

“*Gordonvale*.—In this locality the cane also was looking very vigorous. The Mill harvested approximately some 4,100 acres, for a return of 85,500 tons of cane, giving an average per acre of 20.8 tons; 4,500 tons were also crushed for Babinda, making the total of 90,000 tons. Of this amount, over 80 per cent. of the total was burnt. Considering the average tonnage per acre, and the thorough cultivation that is generally carried out in this area, this percentage of burnt cane seems very high. The average density was 12.86 c.c.s. As a large amount of rain fell during the season these figures are very fair.

“Since the new year a surprising amount of dismantling work has been carried out in the mill. The alterations involved are vast, but if the amount of energy that is now being put into the work by the various responsible officers is any criterion of its future success, then the 1922 season will be all that the many wellwishers of the Mulgrave Mill hope for. When completed, the mill will be in a position to handle 5,000 tons of cane per week.”

PORTABLE TREE-FELLING AND SAWING PLANT.

The felling of trees is part of the early work of the pioneer in nearly all countries, and many appliances have been devised for lightening the labour involved. One of the latest, which has the advantage of lightness and efficiency, has been put on the market by a British firm. It is driven by an engine which develops $2\frac{1}{2}$ h.p., and it is capable of felling trees with the engine placed in almost any position relative to the tree. The saw is driven by means of a coupling-rod with universal joints. A clutch is provided to obviate the stopping and restarting of the engine every time the cut is altered. The engine is also provided with a pulley so that it can be used for driving stationary machinery. When the machine is employed for sawing logs the handles of the machine rest on the log, a movable chain with pointed hooks being provided to hold the log secure. It is a very simple matter to alter the machine from tree-felling to log-sawing, and the machine can be readily moved about and operated by one man.

BRITISH CONCRETE MACHINE.

At a recent exhibition held in London, a remarkable display of concrete machinery of various kinds was made by a large number of British firms. One of these machines was a concrete block maker capable of turning out 1,000 blocks in an eight-hours working day, or 130 partition slabs per hour. When used on a house-building contract, two of these machines turned out, on the average, 2,400 blocks per day of eight hours for a period of two months. On one day the two machines actually produced 3,320 blocks in eight hours. Another machine, designed for making concrete slabs for paving purposes, averaged between forty and fifty slabs in the hour, and has produced as many as sixty per hour under service conditions. A third machine is capable of producing everything in the way of material that a builder or anyone undertaking repairs to property may require. Blocks of various sizes, bricks, window-sills, steps, hearths, mantelpieces, wall-coursings, and so on, can all be produced by this machine.

WHAT PART CAN CHALCID WASPS PLAY IN CONTROLLING AUSTRALIAN SHEEP-MAGGOT FLIES?

By PROF. T. HARVEY JOHNSTON and O. W. TIEGS, University, Brisbane.

In the "Queensland Agricultural Journal," June, 1921, there appeared an article by the senior author, entitled "The Sheep-Maggot Fly Problem in Queensland," in which certain investigations undertaken at the University in connection with the Walter and Eliza Hall Fellowship were referred to. In August, 1921, the writers published a paper in the "Proceedings of the Royal Society of Queensland" describing the results of their experiments as to the economic importance of chalcid wasps with regard to the control of the sheep-fly pest. As contradictory statements have been made from time to time regarding these insects, it was thought advisable to prepare the present article to give wider publicity to the views therein expressed, and to take the opportunity to add some further observations.

The extent to which a parasitic insect, such as certain wasps, can control its host (*i.e.*, the insect or other organism in which it lives) depends on a number of different factors. (1) One of the most important of these is the readiness with which the parasite can gain access to the insect that it is able to destroy. If only a small percentage of the number of individuals of the species upon which or within which the parasite breeds is available for attack, then the economic importance of the latter is small; in fact, its usefulness depends directly upon the ratio of the number of host insects (sheep-maggot flies in this case) available for attack to those which are inaccessible. In other words, if only a small percentage be liable to infestation, then the controlling influence of the parasite will be comparatively small. (2) A second very important factor is the relative rates of breeding of the parasite and its host, not merely in regard to numbers of offspring produced, but also as regards the length of the life-history in each case. (3) Other factors which need to be considered are the presence of food for the adult stages of the parasite; the suitability of the environment as regards temperature and humidity; the presence of hyperparasites, &c. The effects of the various factors just mentioned could not readily be estimated in the laboratory, but the first (1) and second (2) were investigated. The results obtained proved unfavourable so far as most of the chalcids hitherto described as sheep-blowfly controls in Australia were concerned, and indicated that unless their behaviour under field conditions in sheep country was quite different from that which was observed in Brisbane, then little importance could be attributed to them as controlling agents. As indicated in a previous article in this journal, there are eight such wasps known in Eastern Australia as parasites of blowflies, while a ninth, which infests house flies, is also known. All nine are recorded from Queensland.

1. *DIRHINUS SARCOPHAGÆ* FROGGATT.

According to its discoverer, Mr. W. W. Froggatt, Government Entomologist, Sydney, this "digger wasp" is capable of digging beneath the surface of the soil in search of pupæ in order to lay its eggs in them. Our observations in the laboratory have not confirmed this, though it was found to readily oviposit in exposed pupæ of many different kinds of blowflies. The species, whose biology has been studied by us, is not very common in Brisbane and probably elsewhere also. Its importance in controlling blowflies appears to be negligible.

2. *PACHYCREPOIDEUS DUBIUS* ASHMEAD.

This small wasp, a parasite of house flies, is known to occur in North Queensland, but its relation to blowflies has not been ascertained. It appears to be so uncommon as to be of no importance economically in this State.

3. *HEMILEXOMYIA ABRUPTA* DODD.

This is a fairly large Diapriid wasp, about a quarter of an inch long, first obtained by Mr. Froggatt from the small black blowfly (*Ophyra nigra*), and later from *Calliphora villosa* (= *Neopollenia stygia*) in New South Wales. We have taken it from a carcass in the vicinity of Chinchilla, West Queensland (September, 1921). Mr. Froggatt, in his latest article ("Agric. Gaz., N.S.W.," Oct., 1921) describes it as parasitising the maggot stage, crawling amongst putrid matter in search of the fly larvæ. In this respect it acts like *Australencyrtus*, to be referred to later. It would be worth while to endeavour to breed up this wasp and to study its biology. Its habits, as far as we know them, should render it a valuable insect, if sufficiently abundant.

4. *CHALCIS DIPTEROPHAGA* GIRAULT AND DODD.

We found this species attracted to blowfly-maggots on one occasion in Brisbane. It was previously bred from fly pupæ in North Queensland. Its rarity prevents it from being an efficient blowfly exterminator.

5. *CHALCIS CALLIPHORÆ* FROGGATT.

This species resembles No. 4 in general characters, but possesses reddish-yellow antennæ and a shining red-brown abdomen. It was described as attacking living maggots, depositing a single egg in each. Like the preceding wasp, its rarity prevents it from becoming an important enemy of blowflies. It is known from New South Wales and North Queensland (W. W. Froggatt). The plate depicting this species, and contained in the senior author's previous article in this journal, was inadvertently inserted there by the Editor.

6. *PARASPILOMICRUS FROGGATTI* JOHNSTON AND TIEGS.

This proctotrypid wasp was first obtained by us in 1920 from naturally infected pupæ of the common green blowfly (*Lucilia sericata*). We have since met with it on several occasions in Brisbane, but it is too uncommon to be of any real economic importance. It is a parasite of blowfly pupæ, ignoring the maggots.

7. *SPALANGIA MUSCIDARUM* RICHARDSON.

Though originally described from the United States as a parasite of house and stable flies, it was found by us to occur in Queensland, naturally infesting the pupæ of various fleshflies and blowflies, in addition to those mentioned. In the Upper Burnett district more than 40 per cent. of pupæ of species of *Musca*, collected in the field, were found to have been parasitised and destroyed by this ant-like wasp. It is not common in Brisbane.

Some years ago Mr. F. H. Taylor sent us *Lucilia* pupæ from Roma, from which *Spalangia* was bred out in Brisbane. We were not able to distinguish it from *S. muscidarum*. A number of them were submitted recently to Mr. A. Girault, the well-known authority on chalcids and the describer of all the known Australian species of *Spalangia*, but he stated that the determination of species belonging to the group was almost impossible at present on account of the confusion which had crept into the literature. Mr. Froggatt ("Agric. Gazette, N.S.W.," November, 1921) referred to Mr. Taylor's specimens as *S. grotiusi* Girault. For the present we prefer to retain them under Richardson's name.

8. *NASONIA BREVICORNIS* GIRAULT AND SANDERS.*

This, the best-known chalcid parasite of the pupæ of muscid flies, has been utilised widely in New South Wales and Queensland in the attempt to control sheep-blowflies. It does not attack the maggot stages.

In order to determine the economic value of this insect, a number of experiments were carried out. It was first deemed necessary to estimate the extent to which blowfly pupæ (*Pycnosoma*, *Lucilia*, *Sarcophaga*, *Ophyra*) were available for attack. Some fully-grown larvæ were placed on soft soil, $\frac{1}{4}$ to $\frac{1}{2}$ in. in depth, in a shallow basin; they soon pupated below the soil, and the basin with its contained pupæ was put in a cage in which were numerous female *Nasonia* wasps, but the latter were found to be unable to reach the pupæ, which were apparently safe from attack.

It is then very important to know where sheep-maggot flies pupate. The simple experiments to be mentioned now were carried out in Brisbane partly in the open and partly in the laboratory, both giving quite similar results. Still, as we have not had the opportunity to repeat them under natural sheep-land conditions, they cannot be accepted as conclusive. It should be noted, however, that those who have advocated the use of this chalcid have not paid any attention to this side of the question, upon which so much really depends.

Mr. Froggatt ("Agr. Gaz., N.S.W.," Oct., 1921, p. 726) mentions that the larvæ which are being bred up in his laboratory, in order to undergo artificial infestation later, leave the decomposing liver which serves as food, bury themselves into the sand used in the breeding boxes, and there pupate. In the succeeding number of the "Gazette" (Nov., 1921, p. 809) he states that the fully-fed larvæ, on falling from the live wool to the ground, usually pupate above the soil, while those in a dead beast crawl to the edge of the disintegrated carcass to pupate and are thus nearly all accessible to the ovipositor of the pupa-parasitising wasp.

The following experiment with *Lucilia sericata* (the green blowfly and one of the commonest sheep-maggot flies) was carried out by us in Brisbane:—A number of females were permitted to lay eggs on meat placed above some soft soil. Only

* Mr. A. Girault has just informed us by letter that the correct name of this wasp is *Nasonia abnormis* (Boheman), originally described from Europe.

the fibrous debris ultimately remained, and under this the larvæ could easily have pupated. Layers of underlying soil were carefully removed and the pupæ contained in each counted, the following results being obtained:—

	Pupæ.
On surface or partly exposed	105
To depth of $\frac{3}{4}$ inch	663
From $\frac{3}{4}$ to $2\frac{3}{4}$ inches	1,403
From $2\frac{3}{4}$ to $3\frac{1}{2}$ inches	172
From $3\frac{1}{2}$ to 5 inches	51
From 5 to 6 inches	7
Below 6 inches	0
Total	2,401

Out of a total of 2,401 pupæ, only 105, i.e., 4.37 per cent., pupated in positions within reach of *Nasonia*. It was found that in wet weather all the pupæ were located beneath the surface. We have repeated the experiments with the large green blowfly (*Pyenosoma* (or *Chrysomya*) *rufifacies*) on several occasions, with practically the same results, its hairy pupæ generally being situated below the surface. When a pastoralist turns over a carcass which has recently been destroyed by maggots, he may find thousands of pupæ beneath it, and of these perhaps at least half (or even up to 80 per cent.) may be parasitised and destroyed by the chalcid; yet the fly nuisance increases. The explanation—supposing that larvæ behave in the field as they do under laboratory conditions—is that for every pupa seen on the surface, twenty or more are to be found beneath the surface and out of reach of the wasp. These results are not encouraging.

Let us examine the second factor in effective parasitism, viz., the relative rates of breeding in the case of *Nasonia* and the sheep-maggot fly (*P. rufifacies*). Our observations in Brisbane show that the minimum period elapsing between the deposition of the eggs of the chalcid and the time when the resulting wasps which hatch out are ready to lay eggs, is about ten days; while in the case of the blowfly it is longer—a fact in favour of the chalcid. But let us examine further. The blowfly lays, as far as is known, on an average, about 250 eggs, whereas the chalcid deposits about 113. Now, unfortunately, the latter do not cause the destruction of 113 blowflies, since the wasp deposits on an average about six or seven in each pupa, thus parasitising from seventeen to twenty blowfly pupæ. At times the chalcid may deposit a much greater quantity in each pupa, so that the number of flies destroyed is correspondingly less.

A third fact tells against the importance attributed to *Nasonia*. During the height of summer it is found that the pupal period for the hairy maggot-fly is from three to four days. Even though the wasp may have deposited its eggs in a fly pupa, yet no harm can result until after the hatching of those eggs, an event which we found takes about forty hours to occur. Thus, out of the three or four days in which the wasp might destroy the pupa, nearly two days are necessarily lost during the hatching of the eggs. Hence if the pupæ are not attacked within about two days (perhaps less in summer) after pupation, the wasp can no longer injure them, no matter how many eggs may be laid in them after that period. Moreover, such eggs must perish when the fly emerges.

Most of the empty puparia, from which flies have escaped, would be removed by wind. It is almost certain that observers collecting fly pupæ in the field, in order to estimate the percentage of parasitised material, would pick up only the unhatched pupæ. Since the young stages (larva and pupa) of the chalcid occupy about eleven days, infected fly pupæ are, then, accumulating for eleven days underneath carcasses in the field. Blowfly pupæ, on the other hand, take only three or four days to develop into flies, so that uninfected pupæ are accumulating for that period only, under similar circumstances. Hence, when the collector brings in a batch gathered in the field on any particular day, he is really including both parasitised and non-parasitised material, but these would not be in the ratio in which they actually have been produced, but in the ratio of their relative rates of accumulation. In other words, there would be perhaps three or four times as many infected pupæ as should be taken into consideration when estimating a percentage infection. Of course, a series of collections at intervals of about three days would give a much more accurate result, as it would account for the uninfected flies which otherwise would have emerged and not become included in the tally. From the foregoing it will be seen that as a result of casual collecting there is great probability of a totally incorrect result being obtained.

We may, then, summarise the results regarding *Nasonia*:—

- (a) The majority of sheep-maggot flies apparently pupate in places where they are not exposed to infection by *Nasonia* or other pupa-infesting wasps; hence only the smaller number which have pupated on the surface can become parasitised.
- (b) Flies breed much faster than do the wasps, a single female *Nasonia* being able, on an average, to destroy from seventeen to twenty fly pupæ, whereas a single female blowfly can produce about 250 flies.
- (c) During the hot season (e.g., February) blowfly pupæ, on account of their accelerated development, enjoy a considerable degree of immunity from effective attack by such wasps as parasitise the pupal stage.

As a result of our observations, we are forced to regard *Nasonia* as a greatly overestimated factor in the control of blowflies.

9. *AUSTRALENCYRTUS GIRAULTI* JOHNSTON AND TIEGS.

This "brown-legged wasp" was discovered last year by us in Brisbane, and by Mr. Froggatt in New South Wales. It appears in the former locality in abundance during October and November (when *Nasonia* is not so common), but diminishes as the summer advances (when *Nasonia* becomes more plentiful).

It is slightly larger and more active than *Nasonia*, and is readily recognised by its yellowish-brown undersurface and its brown legs. The female confines its attention to the maggots, searching for them even amongst putrid material, and parasitising them even when fully covered by a thin layer of the decaying matter in which the larvæ are feeding. Pupæ are ignored by it. Apparently from five to seven eggs are deposited in a maggot at each act of oviposition (not merely one egg in each pupa as stated recently by Mr. Froggatt).

The wasp can be readily bred in captivity. During midsummer a period of twenty days elapses between oviposition and the emergence of the resulting adult wasp. This period lengthens to about twenty-five days in spring (October), twenty-eight to thirty in autumn (May); and about six weeks during winter (June and July). The female is able to parasitise maggots on the day of its emergence from the destroyed fly puparium.

The long developmental period appears to be a disadvantage from the point of view of efficiency in fly-control, but the fact that this wasp can attack the maggot stage is very much in its favour, because of the length of time occupied by the fly in this stage, and because of the need of the larva to maintain communication with the air, this giving the wasp an opportunity to attack it. An illustration of its efficiency was noticed last October, when, in order to obtain a supply of fly pupæ, some meat was exposed in a glass jar, soil being placed in the bottom of the jar to receive the pupating insects. The latter pupated under the soil, from which they were subsequently collected. On examination it was found that nearly all contained about five larvæ or pupæ of this wasp, this being apparently about the number deposited as eggs at one oviposition. This observation is open to the same objection as was raised against the recorded percentages of infection of pupæ by *Nasonia*, so that the actual percentage of infestation observed may have been too high. A more serious objection which it shares with *Nasonia* is the periodic nature of its appearances, but by means of laboratory supplies this could be remedied. It seems to us to be well worthy of trial under field conditions in Western Queensland.

This wasp was recently described in the "Agricultural Gazette, N.S.W.," (October, 1921, pages 730-1), by Mr. A. P. Dodd under the name *Stenosterys fulvoventralis*, which is a synonym of our name *Australencyrtus giraulti*. The inclusion of the species in the genus *Stenosterys* appears to have been due to the difficulty in observing the structure of the mandibles. The presence of three "teeth," however, removes it from the Ectromini, to which *Stenosterys* belongs, and places it among the Mirini of Ashmead, or the Encyrtini, as conceived by Girault.

10. *ALYSIA MANDUCATOR* PANZER.

Alysia is a large braconid wasp, stated to be very active in controlling house flies in England, and, according to Professor Lefroy, would be of great value in combating the Australian sheep-flies. This insect has the special advantage that it attacks the maggot stage and lays only one egg in each. As it is capable of depositing a very large number of eggs, its effective destructive power must be considerable.

According to Mr. Froggatt, it is "an indiscriminate parasite on the pupæ of all kinds of flies, and among others is very partial to those of the European syrphid flies." As the latter are very useful agents in controlling aphids which attack cultivated plants, careful observations regarding the relation of *Alysia* to such useful flies would need to be made before the utilisation of even such an ally as *Alysia* should be attempted.

CERTIFICATES OF SOUNDNESS.

FEBRUARY REGISTRATIONS.

Name of Stallion.	Breed.	Period for which Certificate was issued.	Owner's Name.	Owner's Address.
Hindoo Lad ..	Blood	Life ..	W. Baguley ..	Pratten Street, Warwick
Victor Wilkes ..	Trotter	Life ..	C. W. Free ..	Headington Hill, Clifton
School Boy ..	Pony..	12 months	W. J. McKone	Allan's Siding, Goondiwindi Line

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JANUARY, 1922 AND 1921, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Jan.	No. of Years' Records.	Jan., 1922.	Jan., 1921.		Jan.	No. of Years' Records.	Jan., 1922.	Jan., 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton	12.44	20	8.27	7.37	Nambour	9.47	25	4.39	9.18
Cairns	16.98	39	6.05	15.65	Nanango	4.58	39	3.22	3.32
Cardwell	17.30	49	3.92	12.44	Rockhampton ...	9.25	34	4.36	4.67
Cooktown	14.74	45	8.08	33.67	Woodford	7.43	34	3.49	8.81
Herberton	9.88	34	6.86	5.22	<i>Darling Downs.</i>				
Ingham	16.78	29	3.15	15.39	Dalby	3.34	51	3.09	2.31
Innisfail	21.02	40	6.03	18.19	Emu Vale	3.22	25	1.24	0.83
Mossman	18.81	13	9.25	13.72	Jimbour	3.80	33	1.48	3.21
Townsville	11.91	50	5.23	5.75	Miles	3.92	36	2.77	2.42
<i>Central Coast.</i>					Stanthorpe	3.60	48	1.20	1.07
Ayr	12.37	34	6.55	8.09	Toowoomba	4.99	49	2.28	2.94
Bowen	10.55	50	5.12	6.99	Warwick	3.61	34	1.29	1.25
Charters Towers ...	5.78	39	2.26	8.81	<i>Maranoa.</i>				
Mackay	15.32	50	4.78	15.91	Roma	3.44	47	3.59	1.41
Proserpine	18.40	18	3.12	14.96	<i>State Farms, &c.</i>				
St. Lawrence	10.03	50	2.05	18.30	Bungeworrai ...	2.32	7	2.41	1.35
<i>South Coast.</i>					Gatton College ...	4.37	22	2.39	2.34
Biggenden	5.46	22	4.04	5.37	Gindie	4.04	22	3.91	3.12
Bundaberg	9.26	38	7.54	7.41	Hermitage	2.97	15	1.40	1.83
Brisbane	6.42	71	3.62	4.04	Kairi	8.80	7	Nil	5.19
Childers	8.03	26	6.13	5.52	Sugar Experiment Station, Mackay	17.14	24	3.71	12.70
Crohamhurst	12.56	30	7.26	12.41	Warren	7.19	7	2.44	4.80
Esk	5.66	34	2.88	3.96					
Gayndah	4.83	50	2.13	4.94					
Gympie	6.81	51	2.88	6.41					
Glasshouse M'tains	9.17	13	4.67	8.38					
Kilkivan	5.80	42	1.14	4.15					
Maryborough	7.42	50	3.14	7.34					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for January this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

Editorial Notes.

1922 Cotton Season.

Cottongrowers are reminded of the importance of waiting until their product is quite mature before commencing picking. The boll should be fully opened. Ripe cotton means higher profits and time saved in harvesting. The Australian Cotton Growing Association has arranged to receive and gin this season's crop. Machinery is now in course of assembly and installation and structural work is well forward. The Association will be prepared to receive unginned cotton at the Rockhampton Ginnery on 18th March, and at the Hamilton (Brisbane) Ginnery on 1st April.

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The Commercial Side of Farming.

Everyone interested in the welfare of rural industry, and therefore who thinks nationally, knows that the unsatisfactory conditions with which agriculture is burdened to-day are due in a very large measure to lack of effective co-operation. Agriculture is not merely farming; it is a business, an industry, and on its commercial side it has two important aspects. From a national point of view it is desirable that food should be produced at the most reasonable price to the consumer compatible with a fair profit to the producer. From the farmer's point of view it is essential that he should be able to market successfully that which he produces not only in lean seasons when supply is less than the demand, but also in seasons of plenty when conditions are reversed. He should always be stimulating demand, and the best stimulus is reasonable prices. To sell at reasonable rates it is important that produce should reach the consumer loaded only with the lowest possible intermediate charges. The cost of production and distribution must be reduced to a minimum. In turn the cost of purchasing machinery, fertilisers, and other equipment and commodities necessary for the carrying on of the farmer's business should also be reduced to a minimum. And to ensure this reduction both ways, agricultural co-operation is the only effective means. The advantages that lie in the bargaining power of combination are obvious. By combination in both buying and selling the farmer would receive: (1) the benefit of wholesale rates, and (2) reduction of intermediate costs of distribution. The days of single purpose co-operation are passing. What is seriously engaging the thought of those concerned most closely with rural economics is not only the co-operation of individual farmers but also the effective co-operation of co-operative concerns. The whole strength of the co-operative movement depends upon the reality, the extent, and continuity of combined action. In no other way can farmers secure the best terms on both the buying and selling sides of their business. By no other road can they reach a position of commercial strength which will enable them to meet the biggest buyers of their produce on level ground. An unalterable condition of the acquisition and retention of that power is their absolute loyalty to their own business ventures. The weakness of co-operative concerns to-day is that farmers are often not loyal to the enterprises they themselves have created. Not that they, less than any other section of the community, are wanting in the moral quality of loyalty, but, for some reason or other, they apparently cannot see how much it is to their advantage to maintain effective and continuous combination for the sake of the commercial power it would confer upon them. If farmers get together, stick together, and act together in all things for the betterment of their industry, it will not be long before they will be in a position to effectively control their business on both sides from the bucket to the selling floor, from the paddock to the pantry, and reap rewards for their labour that would be reasonable and just.

General Notes.

SHEEP AS A SIDE LINE.

Writing in the Mackay "Daily Mercury" (18th February, 1922), a correspondent says:—"For many years our State Government sheep expert, Mr. W. G. Brown, has reasoned with and urged on settlers on the coast to take on a small flock of sheep as a side line. The great majority of those who took Mr. Brown's advice and followed his teaching have good reason to congratulate themselves and thank him. The small percentage of failures has been mostly due to the fault of the settlers. Right at our door we have proof positive that sheep will do well on the coast, and proof not alone that they can be fed but that they can be bred. The L Islands have carried sheep for some years, and, judging by some I have seen from there, the

Messrs. Bussetin are going intelligently to work to develop a very fine class of sheep. But, long before sheep were put on L Islands, Captain Adderton had established a flock on Lindeman Island, the most northern of the group of which the L Islands form the southern part, and descendants of that flock are still on the island. Thus, Lindeman Island has been constantly under sheep for a period of about twenty-five years. Actually the grazing quality of the island has vastly improved; and the sheep, though largely of the Merino strain, have not deteriorated. The present owner, who bought out Captain Adderton, has, however, introduced Border Leicester rams, and the result should be a great improvement in frame and weight of fleece. Lindeman Island is certainly ideal for coastal sheep-raising. It has a perfect harbour, and is within easy reach of Mackay, Proserpine, or Bowen. It has abundant and permanent water, and a rich black basaltic soil. It is splendidly grassed, and is capable of carrying safely up to 5,000 sheep. I was present during shearing, and had practical demonstrations of the freedom from seed in the wool. But there are opportunities right here, on the mainland, for intelligent farmers to keep a small flock of sheep as a side line, and these farmers need not be afraid to breed lambs for market or home consumption. The lantana farmers, of whom, unfortunately, we have a large proportion, would be well advised to leave sheep alone."

KUDZU—A REMARKABLE FODDER VINE.

At Mr. Hugh McMartin's farm, Glen Pullen, Indooroopilly, may be seen a patch of kudzu, a leguminous plant for which great possibilities are claimed. In the United States it has a great name as stock feed and as a milk-producer. The plant at Glen Pullen has made remarkably rapid growth. In appearance it is not unlike a cowpea, but sends out long runners which root readily at the nodes. The plant is said to be a good yielder on poor soils and is so vigorous and spreads so rapidly as to soon smother weed growth. Introduced by the New South Wales Department of Agriculture about three years ago it is comparatively little known in Australia. The plant, it is said, was originally brought from Japan to America at the time of the St. Louis Exhibition for decorative purposes. In Florida (U.S.A.) it is grown on trellises about 10 feet apart, and animals are fed between the rows. It is hard to start for the first year, but after that there is no holding it. It is claimed that when established it can sustain six cows to the acre. In Florida it has yielded 10 tons of fodder per acre.

Analysis (Professor Piper, U.S.A.).—Water 69.4, ash 2.2, crude protein 5.5, fat 1.0; carbohydrates fibre 8.3, free extract 13.6.

SHOW DATES, 1922.

Inglewood: 14th and 15th March.
 Pittsworth: 23rd March.
 Killarney: 29th and 30th March.
 Dalby: 29th and 30th March.
 Toowoomba: 4th to 6th April.
 Sydney Royal: 10th to 19th April.
 Chinchilla: 11th and 12th April.
 Herberton: 17th and 18th April.
 Miles: 19th April.
 Nanango: 20th and 21st April.
 Goondiwindi: 25th and 26th April.
 Longreach: 2nd and 3rd May.
 Wondai: 3rd and 4th May.
 Grafton: 3rd to 6th May.
 Toogoolawah: 4th and 5th May.
 Blackall: 9th and 10th May.
 Boonah: 10th and 11th May.
 Emerald: 16th and 17th May.
 Roma: 16th and 17th May.
 Ipswich: 17th and 18th May.
 Springsure: 23rd and 24th May.
 Wallumbilla: 23rd and 24th May.
 Maryborough: 23rd to 26th May.
 Lowood: 25th and 26th May.

Beaudesert: 31st May.
 Bundaberg: 1st to 3rd June.
 Marburg: 2nd and 3rd June.
 Gin Gin: 7th and 8th June.
 Gladstone: 13th and 14th June.
 Mount Larcom: 16th and 17th June.
 Rockhampton: 22nd, 23rd, and 24th June.
 Nambour, 5th and 6th July.
 Rosewood: 19th and 20th July.
 Caboolture: 20th and 21st July.
 Barcaldine: 25th and 26th July.
 Crow's Nest: 26th July.
 Wellington Point: 29th July.
 Royal National: 7th to 12th August.
 Belmont: 19th August.
 Murrumbidgee, 22nd to 24th August.
 Zillmere: 1st and 2nd September.
 Gympie: 7th, 8th, and 9th September.
 Wynnum: 9th September.
 Sherwood: 16th September.
 Rocklea, 23rd September.
 Esk Campdrafting: 4th and 5th October.
 Pomona: 4th and 5th October.

PUBLICATIONS RECEIVED.

The *Agricultural Gazette of New South Wales*, for January, has among its main topics a description of "Foot Rot" of wheat, caused by the fungus *Helminthosporium*. Other matters discussed include "Cheesemaking on the Farm," "Reconstructing Milk and Cream," "Onion-growing in New South Wales," "The Energy Value of Some Dried Fruits," and "Cottage Landscape Gardening."

Bananas as Pig Feed.—Among the general notes is a reference to the value of bananas as pig feed. "The experience of farmers in the Tweed River district seems to show that pigs do well if fed on bananas, especially if the fruit is given with skim milk. Green bananas become soft if they are boiled for twenty minutes, and, although rather insipid in taste, are readily eaten. Pigs fatten well when fed in this way."

Paper Mulch for Pineapple Growing.—Another interesting note is a reference to a paper read at the annual meeting of the Hawaiian Pineapple Packers' Association. "Experiments have shown that the use of mulching paper materially increases pineapple production per acre. The idea of a paper mulch for sugarcane was patented some years ago, but no experiments with pineapples were conducted until 1919. It is estimated that there are now 461 acres planted with paper, of which 68 acres will fruit in 1922. The paper mulch appears to consist of a strip of paper in which are cut holes large enough for the pineapple plants to grow through. The first yields from the method were obtained last year, and it was found that the plants in paper grew uniformly larger, greener, and more healthy, and the fruit larger (equal to a little over 3½ tons per acre) and better conditioned. The paper mulch prevents the growth of weeds and the packing of the soil under heavy rains, thus greatly reducing the cost of intercultivation. In an experiment at the Hawaiian Pineapple Association's experiment station, the plant growth on paper mulch was three times greater in weight, and much healthier than on other plots."

The Scientific Reports of the Agricultural Research Institute, Pusa, 1920-21 (Calcutta), are very valuable, and cover a wide area in the field of rural economics.

The Journal of the Department of Agriculture, Union of South Africa, for December, has an account of "An experiment in Egg Production," embracing an interesting report on the building-up of tested laying-strains.

The Journal of the Department of Agriculture of South Australia (January) has listed among its more important features an account of the rise and progress of the South Australian fruitgrowing areas on the River Murray.

The Journal of the Ministry of Agriculture (United Kingdom) for January has among its principal contents: "Suffolk Sheep," "Berkshire Pigs," and a report of the International Labour Conference at Geneva, detailing various phases of the labour problem as applied to agriculture. The report concludes: "Probably agriculture is, of all industries, least susceptible to international regulation, but something is accomplished if this fact comes to be realised after full discussion between the parties concerned—the employers, the workers, and the Governments. From the purely national point of view, again, British agriculture stands to gain if the restrictions on the unlimited use of labour which are dictated by humanity and have become customary under our social conditions can be thus incorporated in the practice of other competing countries."

The Aberdeen-Angus Review (December) is replete with information about the great Scottish cattle breed.

The Journal of the Department of Agriculture of Porto Rico have published in bulletin form:—"An Annotated List of Sugar Cane Varieties," "The Minor Sugar Cane Insects of Porto Rico," and "Changes Wrought in the Grapefruit in the Process of Maturation."

The South African Farmers' Advocate for January discusses very seriously the general agricultural outlook. Market difficulties have, it seems, created a crisis in the Union, and the Australian rural producer is not the only storm-beaten voyager on a sea of trouble. "Kikuyu Grass" is the title of a very informative article on an aggressive drought-resisting plant that is already well known in Australia. The article explains "characteristics of Kikuyu which are not generally known, its growth in conjunction with clover, its uses for feed and other purposes, how to get the best results from it, the conclusions drawn from recent experiments, and other interesting particulars."

The Philippine Agricultural Review (No. 2, vol. xiv., 1921) presents additional data on Adlay, a grain that is receiving a considerable amount of attention in the Philippines. "Altogether it has been demonstrated beyond a doubt that adlay is a palatable and wholesome food for the table, and there is every reason to believe that with a proper mixture of wheat flour it can be used for all purposes for which wheat flour is used."

Answers to Correspondents.

THE GERBERA.

A.S.D. (Cooroy)—

Suggestion much appreciated, and will be adopted. The Curator of the Botanic Gardens (Mr. E. W. Bick) is prepared to assist readers of the Journal in matters relating to horticulture.

A very interesting and instructive paper on the gerbera was prepared by Mrs. Grenning, of Zillmere, and read before the members of the Queensland Horticultural Society. It was published in the "Agricultural Journal" of January, 1920, page 18. Mrs. Grenning is one of the most successful growers of gerberas.

THE CORAL TREE (ERYTHRINA INDICA).

D.McK. (Weir View, Goondiwindi)—

The Curator of the Brisbane Botanic Gardens (Mr. E. W. Bick) advises—

"The Coral Tree described is *Erythrina indica*. It is indigenous and abundant in Northern Queensland, New Guinea, and India. It strikes readily from strong cuttings, planted in late winter or early spring, and may also be grown from seed. It should be more largely planted, being a splendid quick-growing shade tree, and, although deciduous, when in full flower is a glorious mass of colour. It is frequently met with, grown as a shade tree, in the North and South Coast districts of New South Wales. In addition to *E. indica* there are three other indigenous species. *Erythrina vespertilio* (Bat's Wing Coral Tree, referring to the shape of the leaf), is found from the Gulf of Carpentaria down to the Clarence River in New South Wales, and inland on the Maranoa. Leichhardt, in the account of his exploration expedition to Port Essington, reports having met with it throughout. The other two species are found in the far North—one (*E. phlebocarpa*) on the Cape York Peninsula, and the other (*E. insularis*) on the islands of Torres Straits.

"There is a large number of other species of this fine tree, some of which are very beautiful—notably *E. tomentosa*, from Abyssinia; *E. Cristagalli*, from Brazil; *E. caffra*, from South Africa; and *E. Parcelli*, one with beautifully variegated foliage, from the South Sea Islands."

PEANUTS.

W.J. (Hill Top Farm, Glen Eagle)—

The Director of Agriculture (Mr. H. C. Quodling) advises—

"The clean, bright appearance of peanuts to be seen in the shops is characteristic of nuts grown on certain classes of sandy-loam soil, where there is an absence of colouring matter likely to cause discoloration or staining of the shells. Another reason is that the crop has been well harvested and cured under favourable weather conditions.

"Peanuts are also improved in appearance when preparing them for market by grading, brushing, and polishing. Attachments for these purposes are fitted to modern types of peanut-threshing machines, two of which latter are in use in North Queensland.

"Harvesting should be effected as soon as the plants, and the peanuts themselves, show unmistakable signs of maturity. If the harvesting of a ripe crop is delayed, the threadlike rootlets to which the peanuts are attached commence to decay, and, if this occurs, loss in handling is unavoidable.

"A leaflet on peanut-growing and harvesting has been forwarded."

TREE LUCERNE (CYTISUS PROLIFERUS).

T.F.I. (Caloundra)—

The so-called tree lucerne known to this Department—*Cytisus proliferus*—is grown to some extent as a hedge plant, for which it is well suited, as the plants trim well if trained when young. The leaves are not very palatable to stock.

GREASY HEEL.

J. MACA. (Peachester)—

Greasy heel is not infectious, but there is a predisposition to the complaint on the part of certain animals.

SUDAN GRASS.

A.T.J. (Wondecla, *viâ* Cairns)—

The Director of Agriculture (Mr. H. C. Quodling) advises:—

“Great care must be exercised in feeding Sudan grass to stock. It cannot be fed with safety until the plant is well out in head, and animals should be gradually accustomed to it. Cases of poisoning have occurred through turning cattle in to graze on Sudan grass paddocks, particularly where the growth was immature. From analyses made by this Department’s Agricultural Chemist it would appear that sufficient hydrocyanic acid is present in green immature growth to kill cattle; whereas when the plant is in a fairly advanced condition (well out in head) there is little or no danger.”

PINEAPPLES AS PIG FOOD.

G.M.B. (Beerburum)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises:—

“Waste fruit can generally be fed advantageously to stock, but, when considering that pineapples contain from 83 to 90 per cent. of water and only from 10 to 17 per cent. of dry matter, consisting chiefly of carbohydrates (sugars, &c.) and only very little protein or flesh-forming food, it will be understood that very large quantities are necessary to form a proper ration, and that concentrates rich in protein must be given at the same time to give a properly balanced ration. Pineapples contain per 100 lb. only .4 lb. of digestible protein and from 10 to 13 lb. of carbohydrates, and as pigs require for every 100 lb. of live weight a ration containing 3.6 lb. of dry matter, and .45 lb. of protein, about 100 lb. of fruit would be required to give nearly the necessary amount of protein, and about 28 lb. of fruit to give the necessary amount of dry material.

“Usual rations for pigs, consisting of pollard, green lucerne, sweet potatoes, and skim milk, supply the necessary food in 14 lb. of the mixed ration for 100 lb. of live weight, and from this figure it is easily seen that pineapples could not be consumed in sufficient quantities to give a complete ration. Blood meal or meat meal, which contains about .64 lb. of protein in every 1 lb., would be a valuable aid to supply the necessary nitrogenous material, if used in small quantities.

“A complete ration for every 100 lb. live weight would consist of 2 lb. of pollard, 15 lb. of pineapples, and 4 oz. of blood or meat meal.

“The 4 oz. of blood could be replaced by about 9 oz. of linseed meal or of peanut meal, or 1 lb. of sunlight oil cake.”

SULPHATE OF LIME.

W.B. (Palmwoods)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises:—

“Sulphate of lime of gypsum is used in place of crushed limestone or lime carbonate, particularly in the case of heavy low-lying soils inclined to be alkaline. Sulphate of lime has a more powerful action than ordinary limestone in improving the physical condition of clayey soil. Sulphate of lime could not replace quicklime to neutralize acidity in soils due to large amounts of organic matter.”

CHEESEMAKING AND MARKETING.

K. McD. (Yaamba)—

The Chief Dairy Expert, Mr. E. Graham, advises as follows:—

“The local market price for cheese of first-grade quality is 9d. per lb. wholesale, and it is not expected that the price will be reduced in the near future. The value of cheese in the oversea market is now much lower than the rate prevailing during the war period, and the value of cheese in London ranges to-day from 90s. to 96s. per cwt. c.i.f.

"The natural pastures and artificially introduced Rhodes grass of your district are considered suitable as pastures for utilisation and production of milk for cheese purposes. The prevailing climatic conditions are such that provision would have to be made for the cooling of milk, otherwise the milk would probably develop too much natural acidity when kept overnight to allow of the manufacture of cheese of first quality.

"The cheese factory building, equipment, and plant to treat the amount of milk yielded by 200 cows would cost approximately from £750 to £1,000. The quantity of milk yielded by 200 cows would necessitate the installation of a small boiler for the purpose of heating the milk and providing water for cheese-factory purposes, cleansing vats, dairy utensils, floors, &c.

"There are several avenues through which instruction and advice may be obtained in the manufacture of cheese. The subject of cheesemaking may be taken up at the Queensland Agricultural College, Gatton, where an Instructor of Dairying is employed for the purpose of imparting advice and instruction in the theory and practice of cheesemaking.

"Another means whereby an insight into cheesemaking may be obtained is by the employment of a qualified cheesemaker in the factory for a season, and by someone on the dairy farm working under him and acquiring a knowledge of the work.

"There are also Cheese Instructors engaged under this Department who visit factories and give instruction and demonstration of the procedure to be followed in the conversion of milk into cheese. It is to be recognised, however, that a practical knowledge of cheesemaking is an essential to success, and this can be best acquired by the adoption of either of the former methods referred to."

SPEAR GRASS AND SILAGE.

J.J.S. (Queenton) writes:—"It is intended to chaff spear grass and place it in a silo. The silo is small (depth 9 ft.), circular, cement walls, and sunk in ground. Will the fermentation process destroy the injurious spear seeds so that the silage may be eaten by cattle without injury?"

The Director of Agriculture, Mr. Quodling, advises:—

"1. Yes. The chemical changes which take place in silage in a silo will soften the awns of the spear grass, and in this way obviate the otherwise-harmful effect of a full diet of this description. The germinating capacity of grass and other seeds is also destroyed.

"If you have maize, sorghum, sugar-cane, or some other succulent crop available, it is recommended to chaff it and mix it well in the silo with the chaffed spear grass. This latter can by no means be recommended where other fodders are available. Far more satisfactory results, after the expense of constructing the silo, will be obtained by growing a suitable fodder crop to fill it.

"Spear grass will make ensilage of a kind if cut in the soft succulent stage, just when it comes out into head, but even at this time it is not at all nutritious and does not carry very much leaf. The kind and condition of the fodder at the time it is put into a silo has a direct bearing on its subsequent quality. The best ensilage is made from succulent crops cut at a certain stage of development, i.e., in the case of maize, when the grain is in the thick milk or soft dough stage; and in sorghums, when the seed is in a similar condition. Grasses, as a rule, lack that soft succulent condition necessary in a fodder to produce the best results.

"It usually takes between two and three months for ensilage to reach a certain stage of maturity, and to pass the so-called 'new' stage. If you find it necessary to use the silage, it will be quite practicable to do so, say, six weeks after it is put into the pit.

"Whenever fodder shows signs of wilting, or drying-out between the time of cutting in the field and chaffing it into the silo, it is advisable to moisten it, either with molasses in water or with weak brine. A 5-gallon drum fitted with a tap and filled with the liquid, and allowed to drip on to the chaffed fodder as it is about to be discharged, is a handy method to follow. Grass is benefited also by this moistening process.

"You are recommended to tramp the fodder thoroughly into the silo, and, when the latter is actually filled, to give the top a good watering and cover with a thickness (about 1 ft.) of well-trampled earth, and then cover as a protection from rain."

Orchard Notes for April.

THE COAST DISTRICTS.

In the orchard notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus, and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed, that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus become toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruitflies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruitflies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly cleared land time to sweeten before planting.

Strawberries can still be planted, and the earlier plantings must be kept well worked and free from all weeds in order to get a good crop of early fruit.

Scrub land intended for bananas can be felled now, as there will be little more growth, and it will have ample time to dry off properly in time for an early spring burn. Do not rush scrub falling, as it is work that pays for extra care. Lopping will improve prospects of successful fire.

Keep a keen lookout for fruitflies, and on no account allow any fallen fruit of any kind to lie about on the ground unless you are looking for trouble with the ripening citrus crop. Keep the fly in check, and there will not be any very serious losses; neglect it, and there will not be much fruit to market.

The advice given with respect to the handling and marketing of citrus fruit applies equally to custard apples, pineapples, bananas, and other fruits. In the case of bananas handled by the Southern Queensland Fruitgrowers' Association, Limited, grading is now compulsory, and it will undoubtedly tend to stabilise the market for this fruit.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Practically the whole of the fruit crop will have been gathered by the end of March, but several of the later-ripening varieties of apples grown in the Granite Belt may be kept for a considerable time, provided they are free from fly or other pests and are stored under proper conditions. Varieties such as Jonathan can be kept for some months at a temperature of 31 to 32 deg., and later varieties, such as Granny Smith and Sturmer, can be kept till apples come again if stored at the same temperature. At the same time, although storing the fruit at this temperature under artificial conditions enables them to be kept for many months, the fruit can be kept for a considerable period, and marketed from time to time as desired, by storing it in a specially constructed apple-house in or adjacent to the orchard where grown.

Such a store can be cheaply constructed in the side of a hill out of the soil of the district and slabs of timber. The soil will make excellent pisé for walls, and the roof may be constructed of slabs covered with soil. Such a store can be kept at a very even temperature, and if the air is changed during cool nights—not frosty nights—the temperature can be reduced to a low point—low enough to keep the fruit in good condition for many weeks.

All orchards and vineyards not already cleaned up must be put in order, and all weeds destroyed. Keep the surface of the soil stirred so as to give birds and insects a chance to get at any fruitfly pupæ, as it is necessary to destroy this pest whenever there is a chance of doing so.

Land intended for planting during the coming season should be got ready in order to expose the soil to the cold of winter, thus rendering it sweeter and more friable.

If there is any slack time in the course of the month, go over all surface and cut-off drains and put them in good order. Also, if during periods of heavy rain, soft or boggy spots have made their appearance in the orchard, do what draining is necessary, as badly drained land is not profitable orchard land, and the sooner it is drained the better for the trees growing upon it. Soft or boggy spots are frequently caused by seepage of water from a higher level. In this case a cut-off drain will be all that is necessary, but where the bad drainage is due to hard pan or an impervious subsoil, then underground drains must be put in. After draining, the land should be limed. Liming can be done now and during the following three months, as autumn and winter are the best times to apply this material.

When the orchard soil is deficient in organic matter (humus) and nitrogen, try the effect of green-crop manuring; planting the grey or partridge pea and manuring the ground for this crop with a good dressing of finely ground island phosphate or basic phosphate.

Where citrus fruits are grown, they should now be ready for marketing. If the land needs it, it should be given an irrigation, but unless the trees are suffering from want of water it is better to stick to the use of the cultivator, as too much water injures the keeping and carrying qualities of the fruit.

The remarks on the handling and packing of citrus fruits in the coast districts apply to the inland districts also, but these districts have an advantage over the coast in that, owing to the drier atmosphere, the skin of the fruit is tougher and thinner, and in consequence the fruit carries better.

Farm and Garden Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April:—Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in last month's journal.

Potatoes planted during February should be now showing good growth, and must be kept well cultivated by means of the scuffler. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and, where necessary, thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat, *i.e.*, those which require a fairly long period to develop in, every effort should be made to bring the seedbed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally, except cucumbers, marrows, and pumpkins. In connection with these crops, growers are recommended to adopt some form of seed selection for the purpose of improving the quality of vegetables grown by them. Just at present, selections should be made from all members of the cucurbitaceæ (pumpkins, cucumbers, &c.). Tomatoes should also be selected for seed. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5.0	6.51	5.24	6.46	5.45	6.25
2	5.1	6.51	5.25	6.46	5.45	6.24
3	5.1	6.51	5.26	6.45	5.46	6.23
4	5.2	6.51	5.27	6.45	5.46	6.22
5	5.3	6.52	5.28	6.44	5.47	6.20
6	5.4	6.52	5.28	6.43	5.48	6.19
7	5.4	6.52	5.29	6.42	5.49	6.18
8	5.5	6.52	5.30	6.42	5.50	6.17
9	5.6	6.52	5.31	6.41	5.50	6.16
10	5.6	6.52	5.31	6.41	5.51	6.15
11	5.7	6.52	5.32	6.40	5.51	6.14
12	5.8	6.52	5.33	6.39	5.52	6.13
13	5.9	6.52	5.34	6.38	5.52	6.12
14	5.9	6.52	5.35	6.38	5.53	6.11
15	5.10	6.52	5.35	6.37	5.53	6.9
16	5.11	6.52	5.36	6.36	5.54	6.8
17	5.12	6.52	5.37	6.35	5.54	6.7
18	5.12	6.52	5.38	6.34	5.55	6.6
19	5.13	6.52	5.38	6.34	5.55	6.5
20	5.14	6.52	5.39	6.33	5.56	6.4
21	5.15	6.51	5.39	6.32	5.56	6.3
22	5.16	6.51	5.40	6.31	5.57	6.2
23	5.17	6.51	5.40	6.31	5.57	6.1
24	5.18	6.50	5.41	6.30	5.58	5.59
25	5.19	6.50	5.41	6.29	5.58	5.58
26	5.19	6.50	5.42	6.28	5.59	5.57
27	5.20	6.49	5.43	6.27	6.0	5.56
28	5.21	6.49	5.44	6.26	6.0	5.55
29	5.22	6.48	...	...	6.1	5.54
30	5.23	6.48	...	...	6.1	5.53
31	5.23	6.47	...	...	6.2	5.52

PHASES OF THE MOON, ECLIPSES, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when summer time is not in force.

		H. M.
6 January	☾ First Quarter	8 24 p.m.
14 "	☉ Full Moon	12 37 a.m.
20 "	☾ Last Quarter	4 0 p.m.
28 "	☾ New Moon	9 48 a.m.

Apogee on 3rd at 8.54 a.m.
" on 30th at 10.24 p.m.
Perigee on 15th at 9.48 a.m.

5 February	☾ First Quarter	2 52 p.m.
12 "	☉ Full Moon	11 18 a.m.
19 "	☾ Last Quarter	4 18 a.m.
27 "	☾ New Moon	4 48 a.m.

Perigee on 12th at 9.0 p.m.
Apogee on 27th at 12.48 a.m.

7 March	☾ First Quarter	5 22 a.m.
13 "	☉ Full Moon	9 14 p.m.
20 "	☾ Last Quarter	6 43 p.m.
28 "	☾ New Moon	11 3 p.m.

Perigee on 13th at 9.30 a.m.
Apogee on 26th at 5.36 a.m.

The splendid phenomenon of an annular or ring-shaped eclipse of the sun will be seen, if clouds do not intervene, in North Africa (including part of the Suez Canal) and in South America on 27th and 28th March.

The only other eclipse of the year will be the Great Australian Total Eclipse of the Sun on 21st September, of which special particulars will be given.

The apparent proximity of the moon and Delta Tauri early in the evening of 9th January will be of interest to those who possess telescopes or binoculars, also the occultation of Omicron Leonis on the 16th, about 1 o'clock in the morning. On 7th February Delta Tauri will be occulted by the moon about 4 o'clock in the morning, also another small star in the same constellation half an hour later, followed by another within three quarters of an hour after that.

The occultation of Jupiter by the moon on 16th February will unfortunately occur about sunrise at Brisbane, but may be observable at Oontoo, Birdsville, and other places in the far south-west.

The planet Jupiter will be coming into view before midnight in February and March; Venus will pass from west to east of the sun on 9th February; and Mercury from east to west on the 14th. Before the end of March Jupiter and Saturn will be prominent evening stars.

On 21st March the sun will rise almost exactly due east, and set due west, passing from south to north of the equator.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XVII.

APRIL, 1922.

PART 4.

DAIRY CONFERENCE.

Advisory Board Appointed.

Organisation of the Agricultural Industry.

“That an advisory board for the dairying industry of Queensland be appointed by this Conference ; such board to have a provisional tenure of office not exceeding one year pending the constitution of a general council of agriculture, district councils, and local producers’ associations.

“That the objects of the advisory board include the following :—

- (a) To consider the question of investigating, in conjunction with the Department of Agriculture and Stock, the problems relating to the dairying industry of this State ;
- (b) To investigate the methods of production, manufacture, marketing, storage, and distribution of dairy produce ;
- (c) To consider the question of the establishment of pools for dairy produce ;
- (d) To consider the question of the co-ordination of the activities of existing co-operative companies ;
- (e) To consider the question of the improvement of the productiveness of the individual dairy herds by general application of systematic herd testing or any other efficacious means ;
- (f) To consider the question of the purchase of all factory and farm requisites through co-operative channels ;
- (g) To consider the question of fodder conservation ;
- (h) To consider the question of extending the benefits of the Co-operative Agricultural Production and Advances to Farmers Act, or any other means for the establishment of rural credit.

“That this Conference approves of the scheme of organisation outlined by the Premier, and is of opinion that necessary action be taken to bring the scheme into operation at once.”

The foregoing resolutions were unanimously adopted on 24th March at one of the most important gatherings of primary producers in the history of the State.

A NOTABLE GATHERING.

A conference of representatives of dairying interests within the State, convened by the Premier, the Hon. E. G. Theodore, was held in the Land Court Room, Executive Building, Brisbane, on 24th March, 1922.

The gathering was one of the most notable in the history of Queensland, and its decisions are of first importance to all engaged in rural pursuits. Following is a full report of the Conference.

The proceedings were opened by His Excellency the Governor, the Right Hon. Sir Matthew Nathan, G.C.M.G. The Minister for Agriculture (the Hon. W. N. Gillies, M.L.A.) presided, and with him on the platform was the Premier (Hon. E. G. Theodore, M.L.A.).

The delegates and interests represented were—

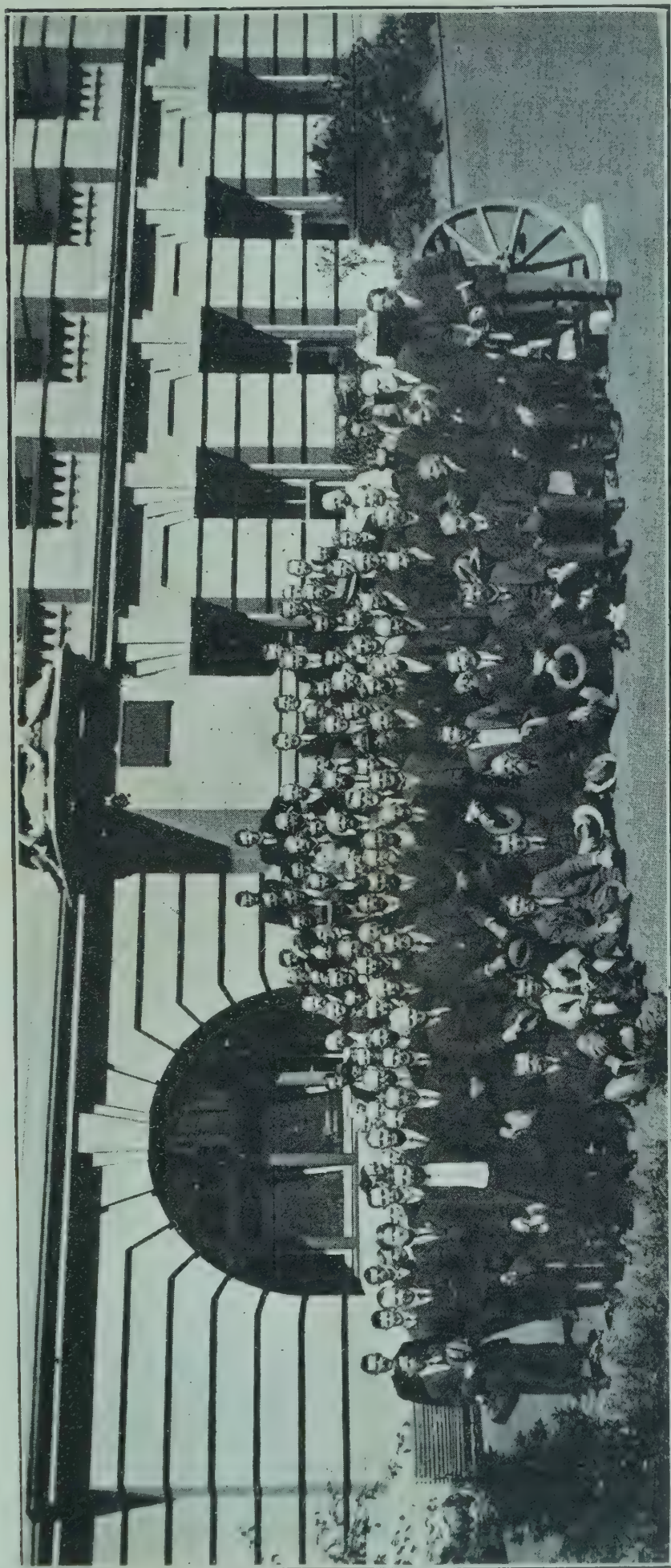
Present :

Secretary for Agriculture (Hon. W. N. GILLIES, M.L.A.), Chairman.

The Premier (Hon. E. G. THEODORE, M.L.A.)

BUTTER FACTORIES.

Atherton Tableland Co-operative Butter Company	SLOAN, W. J.
Bundaberg Co-operative Dairy Company	GREATHEAD, J.
	CROWE, G. F.
Caboolture Co-operative Dairy Company	DOBSON, F. J.
	POPE, W. E.
Central Queensland Co-operative Dairy Co., Rockhampton	PRITCHARD, E. G.
Central Queensland Dairymen's Co-operative Company ..	JOHNSON, R.
	MCDONALD, G. E.
Chinchilla Co-operative Dairying Company	HOLMES, W.
	WARREN, H. T.
Dawson Valley Co-operative Dairy Company	PATERSON, S. D.
	LEPLA, L.
Downs Co-operative Dairy Company	MITCHELL, F. A.
	PURCELL, J.
	MORWOOD, H.
Esk Co-operative Dairy Company	GRAHAM, G.
	RUTKIN, F.
Farmers and Producers' Co-operative Dairy Company, Rockhampton	CONAGHAN, T.
Goombungee Co-operative Dairy Company	DASCOMBE, LEWIS
Killarney Co-operative Dairy Company	PETERSEN, C.
Kin Kin Co-operative Dairy Company	HAPGOOD, W. C.
	MCINTYRE, W. L.
Logan and Albert Co-operative Dairy Company	PLUNKETT, T. FLOOD
	HOPKINS, JOS.
Maleny Co-operative Dairy Company	HOLTON, A.
	BRYCE, CHAS.
	ALCORN, J.
Maryborough Co-operative Dairy Company	NOAKES, G. R.
	DEAN, J. E.
	WICKAN, J. S.
Nanango Co-operative Dairy Company	PERRETT, CHAS. E.
Oakey District Co-operative Dairy Company	ARCHIBALD, J.
	GRAY, A. C.
	DEARLING, —.
Port Curtis Co-operative Dairy Company	KESSELL, J. H.
Queensland Farmers' Co-operative Dairy Company, Booval	RYAN, D.
	PENDER, J.
	STEVENS, H. M.
Rockhampton District Co-operative Dairy Company ..	FISHER, A. E.
	NUTTALL, J. W.
Roma Co-operative Dairy Company	NIND, L. W.
	HEMBROW, R.
South Burnett Co-operative Dairy Company	WITTON, E. W.
	HARTLEY, W. S.



MEMBERS OF THE REPRESENTATIVE DAIRY CONFERENCE, HELD IN BRISBANE, 24TH MARCH, 1922, IN CONNECTION
WITH THE ORGANISATION OF AGRICULTURE

Convened by the Premier HON. E. G. THEODORE
Chairman of Conference, The Minister for Agriculture, HON. W. N. GILLIES

South Queensland Co-operative Dairy Company	..	..	WINNETT, W. G.
Stanley River Co-operative Dairy Company	..	..	CARSELDINE, H.
			BATEMAN, CHAS.
Terrors Creek and Samson Vale Co-operative Dairy Co.			RUDD, E.
Warwick Co-operative Butter and Dairy Company	..	..	BUCKLEY, JAS.
Wide Bay Co-operative Dairy Company	..	..	BETTS, T. E.
			PARKYN, R. B.

CHEESE FACTORIES.

Biddeston Co-operative Dairy Company	..	..	ANDERSON, H. T.
			LITTLE, W. H.
Cambooya Dairy Company	..	..	BUCHANAN, S. B.
			BERRY, JAMES
Cooranga North Co-operative Cheese Company	..	..	HOPPER, N. C.
Dundarra Co-operative Cheese Company	..	..	MARSHALL, JOHN
Emu Creek Co-operative Dairy Company	..	..	THOMAS, C.
Felton Co-operative Dairy Company, Limited	..	..	FITZGERALD, E.
			GAULD, F.
Gowrie Junction Cheese Factory	..	..	HITCHCOCK, C. M.
Greenmount Dairy Company	..	..	BERMINGHAM, P. W.
			STRICKLAND, P. L.
Trongate Co-operative Dairy Company	..	..	BRADY, T.
Kaimkillenbun Co-operative Cheese Company	..	..	SKERMAN, P. J.
Koorongarra Co-operative Dairy Company	..	..	WHITE, P.
			PATERSON, S. L.
Lauriston Co-operative Dairy Company	..	..	STEHN, F. G.
Leyburn Dairy Company	..	..	KIRBY, RICHARD D.
MacLagan Valley Co-operative Dairy Company	..	..	COLE, E.
			REED, J.
Malling Creek Co-operative Factory	..	..	HANSEN, M. P.
Memerambi Co-operative Cheese Company	..	..	SHAILER, W.
Mount Sibley Co-operative Dairy Company	..	..	BELLINGHAM, WM. R.
			PETERS, C.
Mount Tyson Farmers' Co-operative Dairy Company	..	..	STOWER, R. J.
			MCINTYRE, C.
			RUHLE, P.
Pittsworth Dairy Company	..	..	KEEFER, H.
Rocky Creek Co-operative Dairy Company	..	..	FRENCH, T.
			McCULLOUGH, R.
Rodger's Creek Cheese Factory	..	..	PENTECOST, H. L.
Southbrook Co-operative Dairy Company	..	..	O'SHEA, D. G.
Sugarloaf Co-operative Dairy Company	..	..	FREYBERG, H.
Tummaville Co-operative Dairy Company	..	..	CROCKER, RICHARD
Yargullen Co-operative Dairy Company	..	..	PETERS, E.

GENERAL.

Australian Dairy Farmers' Association	..	..	POWER, P. K.
Australian Dairymen's Association	..	..	DOUGLAS, A. S.
Brisbane Butter Pool	..	..	KELSO, W.
Cheese Manufacturers' Association	..	..	PURCELL, W.
Commonwealth Dairy Produce Pool Committee	..	..	GALBRAITH, A. C.
Drillham	..	..	NIXON, A.
Farmers' Alliance	..	..	WIGHT, R.
Fassifern District Council (Q.F.U.)	..	..	SHAW, T.
Gin Gin Dairymen's Association	..	..	CROMARTY, J. F.
Gunalda	..	..	CURRANT, W. G.
"Livestock Bulletin"	..	..	MAYNARD, R. S.
Maroon	..	..	ROSE, S.
Pinelands, <i>via</i> Crow's Nest	..	..	ADAMS, J. S.
"Producers' Review"	..	..	MCANALLY, H.
Queensland Cheese Manufacturers' Association	..	..	TURRELL, E.
Queensland Co-operative Dairy Companies' Association	..	..	TOD, J. T.
			HARRIS, W. T.
Queensland Farmers' Union	..	..	AUSTIN, J. A.
Standard Dairy Company (Condensed Milk)	..	..	STAFFORD, E.
Toogoolawah Dairymen's Association	..	..	NOTT, F. L., M.L.A.
Wyreema Milk Suppliers' Association	..	..	BURTON, G.

REPORT OF PROCEEDINGS.

THE GOVERNOR'S OPENING ADDRESS.

The CHAIRMAN said he had great pleasure in calling on His Excellency the Governor to welcome the delegates and formally open that important Conference.

HIS EXCELLENCY THE GOVERNOR (Sir MATTHEW NATHAN, G.C.M.G.), who, on rising, was received with applause, said he had had the pleasure of meeting some of the delegates before, but on occasions less important than the present one when they were going to discuss what seemed to him to be the greatest factor in the future of Queensland. The problem that loomed above all others in Australia was how to obtain a large virile population, and the solution of that problem he believed to be in agriculture. Mining, other than coal and iron, was never more than temporary, and though there might be—indeed, he hoped there would be—a revival in the mining of Queensland, the permanent prosperity of the country must have another basis. A very large proportion of this country was fit for grazing but not for agriculture: therefore they must keep their wool trade and must get back their beef trade. In the fullness of time, no doubt, they should have secondary industries, but there was little likelihood of their being able to compete with the products of those industries in the markets of the world, and they would have to succeed rather than to precede any increase in population. It was increased agriculture alone that could bring about closer settlement on which the safety and wellbeing of Australia must depend. There was only one way in which such increase could be brought about, and that was by the work of farming being made profitable to the farmer. (Hear, hear!) Undoubtedly he derived profit in body and character from living the most healthy of lives, but he must have something more than that. He must be able to gain from the hard work of his life sufficient to enable him to establish a good home, to bring up a long family as they should be brought up, and to secure for himself in old age, if not affluence, at any rate reasonable comfort and wellbeing. (Hear, hear!)

The Farmer's Business.

The farmer's business, as, indeed, most other businesses that were not wage-earning, was of a speculative nature. In agriculture that element was introduced mainly by the waywardness of Nature, but with knowledge and industry provision could be made to minimise if not to remove the effects of drought, floods, pests, and diseases. This had to be done largely by the efforts of the individual farmers; but there were other elements of uncertainty that could be got over, and of success that could be achieved by the farmers working together. Co-operation could reduce the difficulties arising from fluctuations of particular markets and keep down the charges which accumulated between the cow and the counter, the field and the factory. It could

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improve produce and so heighten its value; and it could improve the producers' lives and so heighten their enjoyment of life. The Premier would explain the lines on which those matters would be discussed. All he (His Excellency) could do was to appeal to those present to make the discussion as free, frank, and full as possible, so that it might be fruitful. He was sure that the Government wished them to speak out their minds in all matters bearing directly on the subject before them. They wanted to know the difficulties of the farmers, not for polemical purposes but with a view to seeing how they could be overcome, and the delegates present, in their turn, should each put forward his case, not so much with a desire to make points in the argument as to arrive at definite conclusions of which a practical trial could be made. That would be a great day if it led to some betterment in the lot of the man on the land and so to new men going on to the land, taking advantage of natural conditions that were as favourable to farming as any in the world. He had great pleasure in welcoming those present and in declaring the Conference to be open. (Continued applause.)

VOTE OF THANKS TO HIS EXCELLENCY.

The CHAIRMAN asked those present to carry a hearty vote of thanks to His Excellency for that very fine speech of his and piece of good advice. He was reminded while His Excellency was speaking of the day when he met His Excellency when he landed in Queensland. On that occasion he, as Minister for Agriculture, felt a little bit disappointed, because in His Excellency's first speech at Parliament House he expressed regret that he did not possess the great knowledge of agriculture that his predecessors had possessed. It was not long, however, before he learned that not only did His Excellency possess that knowledge of agriculture, but that he was more sympathetic towards and more desirous of benefiting agriculture than any of his predecessors had been, and therefore he asked the delegates to carry a hearty and cordial vote of thanks for His Excellency's speech.

(Carried with acclamation.)

THE POSITION OF THE DAIRYING INDUSTRY.**Address by the Minister for Agriculture.**

The CHAIRMAN (Hon. W. N. Gillies): As Chairman of the Conference he was not going to take up very much of their time, although there were many things about which he would like to talk to them. First of all, he would like to apologise for the hurried nature of the summons to the Conference. Unfortunately, the furthest outposts of dairying in Queensland were not able to be represented at the Conference—such as his own electorate, the Atherton Tableland, which was an important dairying centre now and capable of great expansion—because of the shortness of time and the distance away from Brisbane. However, on looking round the room he thought the gathering was fairly representative of the industry. He saw some of the great pioneers of the co-operative movement before him, and he was sure that after all their work they could exclaim with the late Cecil Rhodes, who, on his deathbed, said, "So little done; so much to be accomplished." At that gathering they might very well "Let the dead past bury its dead" and look to the future, but, in the words of the poet, "Act in the living present." That was the great concern—the living present. Each delegate had received a copy of the agenda paper and some of the resolutions that were to be submitted to the Conference, and those resolutions he would like them to look carefully through, because the matter was entirely in their own

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hands. That Conference was an important one. It was the first of a series of Conferences that were to be held in connection with all branches of the agricultural industry.

Necessity for Immediate Action.

The reason for calling the Dairy Conference so hurriedly was because of the unfortunate position the industry found itself in at the present time, and the Government wanted to take some immediate action that would benefit the industry. However, his advice was to be certain that anything that was settled was settled in the right way. Any immediate gain that was not right was not likely to be good to the industry. The industry was a great one, and capable of great expansion, and the foundations they laid to-day should be on a solid and lasting basis. As one great poet had said, "Nothing is ever settled unless it is settled right." Unless they settled their questions right they would come up again. He hoped that they would be able to lay down the basis of a system which would be of lasting benefit to the great dairying industry. He wished to read the wire which had been sent out convening the Conference. If the meeting was not representative, as he had just said, the blame could hardly be attached to any one, because the time was so short, and the Government were urged to call the Conference straightaway, so as to try and solve some of the problems in the dairying industry. The wire, which had been sent out to all butter and cheese factories and condenseries in the State, read—

"You are invited to send two representatives your company one to be a supplier to meet Premier and myself at Land Court Room Executive Buildings Brisbane Friday 24th March, 10 a.m., discuss better organisation of dairying industry with object improving producers' position. Department pays railway fares. Please inform Under Secretary early representatives' names."

A paragraph was also inserted in the Press inviting representatives from all recognised dairying associations. In response to that invitation there was a fairly representative gathering present.

A Few Facts and Figures.

He thought he might be permitted, before calling on the Premier to address the Conference on the general policy of the Government, to give a few facts and figures regarding the dairying industry, which would be of benefit not only to the industry itself but to the general public, as showing the importance of the industry at the present time. The dairying industry in Queensland might be said to be about 25 years of age, as it was about 25 years since the industry took a real start in Queensland. In 1895 there were manufactured in Queensland $3\frac{3}{4}$ million lb. of butter, in 1910 $31\frac{1}{4}$ million lb. of butter, and in 1920 $40\frac{3}{4}$ million lb. of butter. The production of cheese during the same years amounted to 2 million lb., 4 million lb. and $11\frac{1}{2}$ million lb. respectively. During last year there were manufactured in Queensland $4\frac{1}{2}$ million lb. condensed milk. That showed the strides that had been made in the dairying industry in a quarter of a century. During the last three years $67\frac{1}{2}$ per cent. of the butter and 75 per cent. of the cheese manufactured in Queensland were consumed in Australia, showing the importance of the industry to Australia, and that the industry at the present time largely depended on the Australian public for a market. He sincerely hoped that the dependence of the industry on the Australian public for a market would be increased instead of decreased—that the public would come to Australia to consume the butter, instead of it having to be sent overseas. With regard

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to butter, last year Queensland exported 654,623 boxes of butter and New South Wales 644,683 boxes, showing that last year Queensland exported more than New South Wales. Victoria exported 727,707 boxes of butter last year, being slightly in the lead as regards Queensland, but it should be borne in mind that Queensland supplied the Southern States in the winter months with their local requirements. If a deduction were made on that account, he thought it would be shown that Queensland was the biggest exporting State with regard to butter. The value of the industry to-day was approximately $6\frac{1}{2}$ millions sterling, showing that the great dairying industry, with all its drawbacks, disadvantages, and handicaps, was chasing the sugar industry very closely. While it must be recognised that the industry has made phenomenal strides within the early years of its history, it is also manifestly plain that the avenues for further expansion are enormous, and the possibilities are that greater progress will be made in the immediate future than has been achieved during former years.

Better Organisation and Capable Control.

Better organisation and a more capable control and management of the industry by those directly concerned would result not only in the stabilisation of the industry as it exists to-day, but it would provide the foundation for the successful development of the industry upon many thousands of acres of suitable lands, which, so far, have not been utilised for dairy purposes. The acreage of land suitable and available for dairying in Queensland is far in excess of that on offer by Southern States, where the industry has been longer established, and most of the suitable lands are at present in use for dairy purposes. In the Central district and on the Burnett watershed there are thousands of acres of land which are classed as being serviceable for dairying purposes, and, although two butter factories are supplied with cream raised upon the Atherton Tableland, there is room in the far North for great expansion if the price is right. But there are other channels whereby the production of dairy produce may be augmented, and the proceeds from the dairy farms appreciably enhanced, without adding to the acreage of the existing dairy farms or increasing numerically the dairy herds. The principal essentials are comprised in the better organisation of the industry from a producer's standpoint, leading up to:—

- (a) Improvement in methods of farm management and animal husbandry.
- (b) Improvement in productiveness of the individual dairy herds.
- (c) Improvement in quality of dairy produce raised on the farm.
- (d) Reducing to a minimum the difference between the price returned to the producer of dairy produce and that charged to the consumer.

Herd Testing.

The several matters I have mentioned lay bare a field for increased revenue for the producer that so far has not been exploited, but the matters enumerated are of vital importance, and are to be viewed as constituting the foundation of any effective scheme for the betterment of the industry as a whole, and by no other means is it possible for the individual dairy farmer to derive any substantial monetary benefit from the industry. Referring more specifically to the need for improvement in the productiveness of milch cows, he said the Agricultural Department had a system of herd testing which, in his opinion, was a good one. It might be benefited by the establishment of local herd testing societies, as in New South Wales, but he had his doubts about that. If the

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Conference had any suggestions to make for improving the system of herd testing, they would be very pleased to get them. They had approximately 448,000 cows utilised for the production of milk in Queensland. Of that number 113,000 were returned as "dry." In all, more than 7,000 milch cows were submitted to a test last year, and calculated on a commercial butter basis the production of dairy cows in Queensland worked out at about 106 lb. per cow.

The Example of Denmark.

It may not be fair to point to Denmark's average of 400 lb., for they must realise that Denmark was a very old country, with marketing advantages over Queensland; but some disadvantages also—climatic conditions, cost of land, high rents, and so on. But while not pointing to Denmark as something which we can accomplish in Queensland, immediately it would be admitted by every practical farmer that Queensland must increase its average to more than 106 lb. per cow per annum. (Hear, hear!) That could be done with the co-operation of the farmers and the Department. He had never once said that the Department of Agriculture was doing half of what it should do; it should do a great deal more. Any suggestions made by that Conference of practical men would, if possible, be given effect to. Denmark 27 years ago started testing with a production of 122 lb. per cow, and they had now got from 122 lb. per cow to 400 lb. per cow. If they could increase their output in Queensland from 106 lb. per cow to 212 lb. per cow in a few years, they could imagine the effect it would have on the industry and on their banking accounts. He hoped the time would come when, instead of the Department having to enforce regulations which some of the farmers considered objectionable with regard to dairy premises, the united body of dairy farmers throughout Queensland would be able to tell the Department, through their Central Advisory Board, what they wanted, and see that such regulations were properly enforced. That was the position in Denmark. There was no need for the State to do those things if the farmers would do them themselves.

He wanted them to take particular notice of what the Premier said, and he would suggest that, after the Premier had finished his speech, there should be a limitation of time in regard to speeches, so as to secure expedition of business, while not desiring to curtail debate. He did not care if they were here for a week if they were doing good business. (Applause.)

THE PREMIER'S SPEECH.

The PREMIER, who was received with applause, said it was not his intention that morning to outline a party political programme. They wanted to keep the conference as free as possible from party bias or party entanglements. The Government wanted to express its attitude and opinions with regard to what was necessary to meet the situation affecting the agricultural industry, and especially the dairying industry in Queensland. Agriculture was almost stagnant at the present time, and had been so for years. There were literally millions of acres of land in Queensland suitable for cultivation, or, at any rate, close occupation by agriculturists, but there was no great development taking place at the present time. He was well aware that there were certain factors that had hampered agricultural development in recent years. The effect of the war taking away a large number of young men from the community and necessitating the concentration of effort upon other things for a number of years, had prevented any normal development or extension of agricultural and land settlement; and during the last two or three years trade depression and financial stringency, and the aftermath of the war in respect to credit deflation,

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had had the effect of preventing the launching of any large scheme for the extension of agriculture. These facts had to be recognised in order to thoroughly appreciate the present situation, but even allowing for all these factors it could not be denied that the agricultural industry was not on a satisfactory footing. The Government desired to see, as His Excellency had pointed out, a greatly increased virile population in Queensland, and the best way to get that was to get men to go on to the land and to increase wealth production to provide the means for the support of the additional population. (Hear, hear!) But it was not to be wondered at that land settlement was proceeding slowly when one realised the unsatisfactory conditions existing in the agricultural industry in Queensland. While men who were on the land considered themselves not sufficiently remunerated—while the people in rural districts considered themselves neglected, and there was a general atmosphere leading to the impression that there was no encouragement for a man to go on the land—there would be no great progress towards the extension of rural industries.

A Vital Necessity.

The Government had therefore recognised the vital necessity to this State of taking fully into account the problems facing the agricultural industry, and by giving intelligent consideration to those problems to endeavour to overcome them. He was not saying that the policy which the Government outlined was a policy which had been discovered by them alone. The Government did not wish to take all the credit for originating the proposals that would be placed before the Conference that day. For many years, others had recognised the necessity for similar action; but the time had arrived when the farmers—the men mostly concerned—were willing to accept Government co-operation and assistance, and were willing themselves to co-operate with the Government in endeavouring to solve the problems which were capable of solution. One of the difficulties which existed in connection with the agricultural industry—and in referring to agriculturists he was not confining it to the cultivators of the soil alone—but he was speaking of the industry in its broadest sense as embracing farmers, wheat-growers, canegrowers, small graziers, and the whole body of general farmers in this State. One of the things that had militated against the solution of many problems relating to farming had been the lack of organisation amongst the farmers themselves. That lack of organisation—the lack of any common aim and the absence of any common objective had led to the chaotic condition which must necessarily follow when they had one body of farmers pulling against another body of farmers.

Absence of Organisation.

This absence of organisation had led to a condition of absolute disorganisation amongst the farmers in various parts of the State. He thought the situation was capable of being improved. So long as the farmers recognised the necessity of associating amongst themselves and using their combined force and power and intelligence, they could solve, or be the means of the solution of, many of the main problems that were facing the industry to-day. There was at present a certain degree of organisation. He wanted them to understand that he did not wish in any way to reflect on the organisations that existed amongst the farmers at present, but unhappily hitherto the organisation amongst the farmers had been the result of a desire to use the farmers as a party political force. That, of course, was fatal to the success of any organisation amongst the primary producers. (Hear, hear!) He had

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recently outlined in a series of speeches below the Range and on the Downs what he thought might be accomplished by having an effective organisation amongst the farmers, controlled by the farmers, and free of any party entanglements whatever. (Hear, hear!)

The Case for Combination.

There should be an organisation amongst the farmers just the same as they found organisations amongst other sections of the community. They should have organisation amongst the farmers just as they had it amongst the wage-earners and other bodies. The merchants were organised through their various chambers of commerce; the employers and manufacturers were organised in their various associations; the bankers were organised, and also the shipowners—in fact, nearly every section was organised except the farmers themselves; and because of all this organisation elsewhere the farmer had to a large extent been left in the lurch. The necessity then arose that the farmer should organise for his own protection, in order to combat successfully the organisation that was in existence elsewhere. (Hear, hear!) Organisation was a *sine qua non* for the solution of many of the problems facing the agricultural industry in Queensland to-day. He had no doubt that the general remarks he made about the agriculturists in Queensland, and the need for organisation, applied with equal force to the agriculturists in other States, but in Queensland they were concerned with their own affairs first, and they had to solve the problem of organisation effectively and intelligently first, and then, as a result of solving the problems in Queensland, no doubt they would be emulated elsewhere. (Hear, hear!)

An Advisory Board.

He had read criticisms against an advisory board being established in Queensland, because it would apply to Queensland alone and would not affect the agriculturists in other States. It was no reason that they should refrain from taking action just because they had to confine their efforts to their own State. They must start somewhere. If they were able to prove what the effects of organisation and close co-operation were, then no doubt the other States would readily follow on the same lines and co-operate with them and the whole of their organisation would be made effective throughout the Commonwealth. There were a great many problems to be considered by the farmers and in the interests of the farmers in this State. These problems were more complex and in greater number than the problems facing any other industry in this State or in any other class of business. Such problems might be classified as social, economic, political, and educational. By political he did not mean party political. There were a lot of problems relating to the welfare of the farmers which required political attention apart from party politics. There were many matters relating to the farmers which required legislative enactment and administrative action, and it was in that sense that he referred to it as political. He did not suggest that the farmers should eschew all political action so far as their affairs were concerned. The farmers were interested politically in many matters such as the settlement of the Customs tariff. They were intensely interested in the details of the tariff; and they should be able to voice their opinions on the tariff and suchlike matters. And, of course, in their own party organisations the farmers should be able to enjoy as much freedom of action in party political matters as any other citizen, but in the organisation of the agricultural industry they should keep party politics out of it altogether. (Hear, hear!)

*Report of Proceedings of Dairy Conference.***Economic Problems.**

The economic problems were those which, for instance, pertained to the grading and the standardisation of their products in order to meet with the improved marketing conditions. Then there was the question of manufacture of farm products into secondary products, the question of improved methods of production, and of cold storage. The price fluctuations and market fluctuations were matters that closely concerned the farmers and dairymen; so that it was necessary for them to have an organisation which was constantly studying these conditions, gathering accurate statistics, and watching the movements of prices on the oversea markets, and if they had that organisation they would be able to advise the farmers promptly and accurately on all these matters. Then there were such questions as pests, diseases, droughts, and such questions as water conservation, storage of fodder, and innumerable economic problems which arose in the every-day life of every man on the land. All these could be best dealt with by organisation. These things vitally concerned the man on the land. When they had their organisation complete they could employ experts for the benefit of the organisation. It would go a long way towards enabling the farmers, as a body, to formulate a workable policy to put before the Government to carry out. These were the economic phases of the question. He mentioned the political phase because 50 per cent. of the Acts passed dealt directly or indirectly with the man on the land. In passing that legislation the Government had no organisation at present that they could consult with with regard to the details of that legislation.

Beneficial Legislation.

They had passed Stock Acts, Pure Seed Acts, Registration of Stock Acts, Acts relating to co-operation and dealing with pools such as the Wheat Board and Cane Prices legislation, and legislation relating to the dairying side of the question. The Minister had already spoken of the inestimable advantage it would be to the Government as well as to the farmers themselves if they had an organisation which could deal impartially with all questions and furnish advice on legislative proposals. In this way a farmers' organisation would be of great value to the State. If the farmers had such an organisation, and they considered all these questions to submit to the Government, then they would be really responsible for framing the legislation and shaping the policy for the development of agriculture as an industry. Then there was the educational side. It struck him as anomalous that in a State like Queensland, which had to depend so much on the agricultural development of its lands, whose whole future was wrapped up with the development of agriculture, the men on the land themselves occupied a relatively inferior status in the community. This was because of the mistakes made by the farmers generally owing to their lack of proper organisation or of proper means of fully informing the public mind as to what is the relationship of the farmer as a unit in the social structure.

The Status of Farmers.

The farmer occupied a relatively inferior status to-day. At any rate, that was the general conception in the public mind. If they saw a cartoon of a farmer in the papers, he was generally depicted as some kind of horny-handed old hayseed who was incapable of thinking of anything but his plough, or whatever particular implement he happened to be using. It was because of that that the farmers' sons were gravitating towards the cities. The farmer's son did not want to think that the only career in life open to him was to become a cocky. (Laughter.) He appealed to them to see that organisation would improve the status of the farmer

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and would remove that erroneous conception in the public mind. In England and America the farmer would never allow himself to be thought of as an inferior person. Certainly, he would not think himself inferior to a clerk or a quill driver, or to a man punching a typewriting machine. It was the same in Canada, and they could improve the status of the farmer in Queensland in the same way. If they improved the position of the man on the land they would make the agricultural population what it was destined to be—the backbone of the country. They did not want the man on the land to be looked on as something inferior in social status, and that was something the farmers could accomplish for themselves by a proper organisation of the agricultural industry and by the dissemination of educational propaganda give to the public a truer conception of the farmer's worth. In some cases, he did not say it applied to the men assembled before him that morning, but they knew of cases where the farmer was ground down and became a hard-working industrial slave. (Hear, hear!)

A VOICE: That is what he is.

Present Day Conditions.

The PREMIER: They knew in some cases that the man on the land toiled under conditions of absolute drudgery and hopelessness, but that should not be. In the early days of the colony it was necessary for the farmers to go out into the country miles away from railways and pioneer the land. In those days the farmers had no means of establishing settled communities with any degree of comfort. They were the real pioneers of the country, and all honour to them for the pioneering work which they had done. Although they could honour the pioneer of the past, because a man had to pioneer 50 years ago, there was no necessity to-day why the man on the land should be living a life of hardship and suffering from almost the same disabilities as the pioneers of old. There was no necessity for that, although, unfortunately, a majority of them were doing it. It might be said he was outlining some kind of a visionary policy to be attained some time in the distant future. His own belief was that if the farmers in Queensland were strongly organised—they constituted so large a class and so important a section in the community that, if they were strongly organised, and with the co-operation and sympathy of the Government, they could improve all those things relating to rural life.

The Oldest and Noblest Science.

He was referring to the necessity of attending to the educational functions of an organisation of that kind. It was necessary to carry on propaganda amongst the public in order to improve the status of the farmers and all farming industries. It was also necessary to have propaganda for other purposes—propaganda amongst the public in order, if necessary, to increase the consumption of farm products. That was an important matter. It was also necessary to remodel the State educational system in order to give more attention to agricultural education. That was a very important factor indeed. Agriculture was a science—the oldest and noblest science known—(hear, hear!)—but, unfortunately, speaking generally, it was not carried on as a science in Queensland. There were very few men—if he was correct in what he had been told, because he could not speak from personal experience in those matters—there were very few men who carried on farming operations on scientific lines in Queensland. It was necessary for them to take advantage of the discoveries of science and the experience of other countries, and apply them to agricultural production in this State.

*Report of Proceedings of Dairy Conference.***Agricultural Education.**

But, in order to apply science, it was necessary to have a system of education. They could not expect a man who was born in a farming district and had lived on a farm all his life, and had no other tuition, to thoroughly understand the science of agriculture. It was necessary to have imparted to him the common experience of the whole world attained through a long series of years, and after patient research by experts. It was necessary to have that knowledge imparted to the youthful farmer in order that he might become a scientific farmer. The farmers could assist the Government a great deal through their organisations to improve the system of agricultural education—he did not know that he would be justified in calling the present limited kind of agricultural education that was carried on in Queensland a system of education at all, but it was possible to develop it; to have a course of secondary agricultural tuition linked up with the primary schools, and, if necessary, with the University, at which those men who decided upon an agricultural career could, in their early days, get the necessary scientific tuition. The delegates might think that he was dealing with topics that were really apart from the business of the Conference, and to some extent he had been, but he wanted to outline what he had in his mind in order that they would appreciate the sincerity of the Government in approaching that question.

Condition of the Dairying Industry.

It had been brought to the recognition of the Government lately that the dairying industry was not in a satisfactory condition. There were many factors contributing to the present deplorable situation, not the least important of those factors being fluctuation in market prices. Most of the factors that operated now adversely against the dairymen in this State could be overcome by intelligent consideration of the difficulties, and by the formation of a definite policy, and adherence to that policy by the farmers and by the Government. The industry itself must be stabilised. Prices, at any rate, must be stabilised; and he agreed heartily with what His Excellency said about the necessity of assuring to the producers in the agricultural industry a fair remuneration for their toil. (Hear, hear!) Every man at least was entitled to that. No man, at any rate, who had been, as he had been, largely interested in stabilising the conditions of industrial workers could contend against the most essential and indispensable worker in the community having his remuneration stabilised. (Hear, hear!) It was not outside the bounds of possibility for the dairyman, in conjunction with the Government, to bring about conditions that would lead to the stabilisation of prices in their industry. He did not say that could be got by the mere granting of a Government subsidy or anything of that kind. They had to look deeper; first of all for the cause, and then provide something more sound than any kind of spoon-feeding. (Hear, hear!) The solution was easily attainable. There had been a good deal of talk during the last few months—in fact some farmers' journals had ably advocated it during the last year or so, and they were entitled to due credit for the propaganda they had carried on in that connection—they had been advocating the establishment of what was more or less loosely known as an advisory board for the dairying industry. In that direction there was to be found a solution of many of the difficulties.

No Cut-and-Dried Plan.

The Government could not present to the Conference a cut-and-dried plan to solve all the problems and cure all the evils with which they were confronted. It would be useless their attempting that kind of thing, but he thought the

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Conference itself could arrive at the decision to investigate many of the problems, and, by careful, patient, and business-like investigations, formulate a scheme to overcome those difficulties. It was, of course, putting the onus of the solution upon the industry itself—upon the men in the industry—but those in the industry would not complain of that. The delegates present and those whom they represented would not complain if the responsibility was placed on their shoulders of formulating a policy. He did not think anyone could complain so long as that opportunity was given to them and so long as they were assured, when the policy was formulated, that the authorities would do their part in carrying it out. (Hear, hear!)

A Tangible, Attainable Policy.

That was what Mr. Gillies and he had to offer them that day—the invitation to formulate a tangible, attainable policy, and the Government would assist them to carry it out. (Hear, hear!) There had been circulated amongst them a series of resolutions referring to the establishment of an advisory board. That was a practical step, and it was necessary, because there was no royal road to the solution of those problems. No matter how wise a man might be he could not stand there and formulate a proposal which was practical to adopt and which would solve all their difficulties. The problems were so complex, because so deep-rooted, that they wanted an advisory board of experienced men interested in the business thoroughly to consider the matter, sitting, if necessary, frequently and over a long period to formulate a policy for the Government, the Department, or the organisations of farmers and co-operative companies to put into operation. If they had such an advisory board, then they could arrive at some policy that could be applied. There had been a question of the formation of a pool. There was a diversity of opinion as to whether a Queensland pool would be effective. There was a lot of difference of opinion even as to whether an Australian pool would be effective. He did not pretend to be able to say whether a pool was the solution of any of the present marketing difficulties. That was why he wanted an advisory board. Let the advisory board consider that question together with all the other suggestions that might be made to such a board.

Better Co-ordination of Co-operative Companies.

There was the question of better co-ordination of the efforts of the various co-operative companies that were now established; the wisdom of amalgamating all those companies. Those were matters that the board, so long as the industry had full confidence in the board, could consider and formulate a policy upon. His own opinion was that they would never get the full beneficial effect of co-operation if it was carried on sporadically; if they had a co-operative company dealing with 20, 50, or 100 suppliers in one district acting independently of another co-operative company in the next district or some other co-operative company somewhere else, each dealing separately with the agents or exporters or shippers, and all of them working more or less uneconomically—on account of the smallness of their individual operations and the high administrative costs. They could not get a true solution of the marketing difficulties while co-operation was carried on in that loose way. They would have to go in for wholesale co-operation, and they had had experience of it in the kind of co-operation carried on during the war under the aegis of the Federal Government. Take the example when the whole of the wheat of Australia was managed co-operatively in the marketing of it when 100 or more exporting firms and operators were cut out and the thing

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managed by the farmers through their own central board. They had an illustration of what could be done on the lines of extensive co-operation in the wheat pool which was carried on in Queensland.

A DELEGATE: A very good thing, too.

The Wheat Board.

The PREMIER: An excellent thing, too. Now, the Wheat Board started under somewhat disadvantageous conditions. It was hurriedly organised. It came late into the field. It was dealing with farmers who never before had dealt with co-operative effort of that kind, and they must admit—one must admit it candidly—that it made a great success of the business. (Hear, hear!) There was a Wheat Board consisting of five farmers, elected by the farmers themselves, and a chairman. They appointed their staff, settled their own policy, organised the necessary machinery, bought oversea freights, arranged charters, made agreements with the millers, and handled the whole business which was previously handled by large operators in Brisbane and elsewhere, and they managed it successfully. It was the largest wheat crop ever handled in Queensland, and the cost of handling that wheat crop by the farmers themselves was less per bushel than the cost by private enterprise in the previous years. Not only that, but the whole of the profit made in the handling of the wheat—the whole of the saving through more economical management—was returned to the farmers themselves. (Hear, hear!) This was done though they started out with practically no capital in the ordinary sense. It might be said they could not have colossal schemes of co-operation unless they had colossal funds to carry them through. The Wheat Board started without capital in the real sense of the term. Of course, they were able to capitalise the resources of the farmers supplying the wheat and they had a guarantee from the Government, but no actual cash. They started out with nothing, and in one year they carried out transactions aggregating more than £1,000,000. He did not say it would be as simple to accomplish the same result in connection with dairy produce or agricultural produce of other descriptions; but what had been done there and what had been done in the South during the war with large wheat pools, wool pools, metal pools, and other gigantic undertakings managed on behalf of the producers—what was done there in the elimination of large operators, traders, shippers, and exporters—the large body of men who come between the producers and the consumers—could be done in the dairying industry in Queensland. (Hear, hear!)

“Go Ahead.”

If it was necessary—and, in his opinion it was necessary, but whether it was practicable was a different matter—to have co-operation to some extent in connection with dairying, so as to practically embrace the whole of the cheese, butter, and milk products, he would say “Go ahead.” They had the resources, and they could accomplish it. The product was worth millions. The Secretary for Agriculture had referred to the year 1920. The value of dairy products in Queensland alone was estimated at £7,250,000 in 1920, and nearly £7,500,000 in 1921. That was the value of the products, but many of the operations connected with the marketing of those products were left in the hands of private speculators, traders, and exporters whose resources were limited to a few thousand pounds. The farmers, as a body, had to defer to the conditions laid down by a man or a company who had, perhaps, a capital of £100,000, while they themselves had millions of pounds of capital; they raised products worth—for consumption and export—£7,000,000 or £8,000,000. Why should the policy of the farmers be

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dictated by a man who went into the business with a capital of, say, £10,000. They could entirely replace all kinds of agents and merchants and exporters and even operators in London, if they would intelligently organise and work on a sufficiently large scale in Australia. (Hear, hear!) The general manager of the Coastal Farmers' Co-operative Society, Limited (Mr. C. E. D. Meares) dealing with the British butter market and its probable effect upon the Australian industry, said—

“Co-operative men returning from London emphatically endorse the impression current over Australia in December-January last, that strong co-ordinated pressure from speculative agents was deliberately exercised to force values down. These tactics, used simultaneously with the inexperienced, misguided handling of the huge Imperial stocks, caused the breakdown of the London market during the period quoted.”

The “bearing” operations of a few speculators in London broke down the overseas market, and literally resulted in millions of money being lost to Australian producers. Should they not be organised to protect themselves from those operations? (A Voice: Rather!) He believed they could be. He did not agree with the man who said the selling of butter was so complex and intricate a business that it could only be done by those who were well trained in London by private enterprise. He believed that the farmers' organisations here, employing proper experts, highly paid, if necessary, could manage their own business in London just as efficiently as anyone else. He did not say that they could dominate the London market. The percentage of sales over there might not be sufficiently high to enable them to do that, but they could protect themselves from speculative operations, such as Mr. Meares referred to. If the farmers would utilise the brains at their disposal and organise themselves, and employ experts, they would overcome many of these difficulties.

A Concrete Proposal.

The concrete proposals which the Chairman had to submit, which might perhaps be taken as early as possible, was the proposal for the formation of an advisory board. He strongly urged it himself. There was nothing to stand in the way of its appointment. It would be a costly thing to inaugurate, because, in getting the information required in establishing business and in formulating the policy, it would be necessary to employ the best brains they could get, and they would have to pay money to get those brains, but for the first twelve months the Government were prepared to defray the cost of it. (Hear, hear!) The scheme could be carried out. If it proved to be successful the farmers would subsequently have to take the responsibility of financing it in any modified form they liked. He would like to have an opportunity later on during the Conference to briefly outline a practical scheme of organisation of the farmers, which if the farmers endorsed could be put into operation. He would like to consult them about that because the success of the scheme depended very largely on the men in the dairying industry. At the present time, they should speak freely and openly on matters they had to discuss. It did not matter whether they confined themselves to the suggestion for an advisory board or not; if they had grievances or difficulties in connection with the dairying industry, they could, of course, give voice to them. They would find the Government sympathetic, and willing, if possible, to assist them. (Hear, hear!) If they thought the scheme could be improved upon they should not hesitate to make suggestions, because the Government had called the Conference together, not to foist upon the farmers a cut-and-dried plan, but to consult them as to the best means of solving many of their difficulties. (Hear, hear!)

*Report of Proceedings of Dairy Conference.***A Frank and Free Discussion.**

The CHAIRMAN: A series of motions had been circulated, and it was for the meeting to say whether those motions should be moved in their present form, or in some amended form, or whether they wished to move other motions. If there was no opposition, he would suggest that, while they wanted every one to speak frankly and not to curtail discussion, in order to get through the tremendous amount of business before them, the speeches of the mover and seconder of a motion be limited to ten minutes, and that of any other speaker to five minutes, with a right of reply by the mover for ten minutes, with any extension that the meeting may be inclined to give to any speaker.

ADVISORY BOARD.

Mr. H. McANALLY (Jimbour) moved—

That an advisory board for the dairying industry of Queensland be appointed by this Conference; such board to have a provisional tenure of office not exceeding one year pending the constitution of a general council of agriculture, district councils, and local producers' associations.

He believed that an advisory board was the one thing they required to put their industry on a better footing than it had been hitherto. As representing the "Producers' Review," he had made an extensive tour of the Burnett district, both in the South Burnett and along the western line as far as Dulacca, and also in the Central Downs, and had got the collective and individual opinion of large masses of producers. He found that there was a great need for reform in the conditions under which they were working, and the producers welcomed the promise of help from the Government. They must have better methods of production, manufacture, and transit, and also better methods of marketing and distribution. The main point which the producer was concerned about was the marketing of produce. The farmer could always expend plenty of energy at the producing end; but it was futile to ask men to buy a 60-guinea bull, if they were only to get 7d. or 8d. a lb. for their butter. A man was not concerned as to what channels these reforms came through provided he got them. The farmer was one of the most progressive of men. They believed that if the selling end was put on a sound basis, the farmer would not be wanting in making progress; it was at the selling end that they lost the grip, and it was there that they needed the cultivated man. They needed the advisory board here. They wanted a committee of business men, with a thoroughly trained manager and staff, in the interests of the dairymen. He referred to the fact that he happened to be a member of the Wheat Board last year. The Wheat Board was purely and simply an advisory committee. The Premier had told them that they started with nothing, and that was a truism. They had to borrow money to carry on until the negotiations with the Commonwealth Bank were brought to finality. So there need be no fear about bringing the advisory board into being and financing it forthwith. If they had an advisory board they would find themselves on a different plane to what they had been on hitherto.

The Road to Complete Co-operation.

As those present knew, they had travelled a long way on the road leading to co-operation. They still had a good deal to learn, and those who had learned should put it into operation. If they had an advisory board, then, no matter whether they were suppliers, directors, or anything else they would have nothing

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to do with questions of finance, and they would not have to worry about where the money was coming from. If they took notice of the collapse of the butter market they would see that it was caused by the accumulation of the stocks of butter which were allowed to take place in the old country. If they had had an advisory board that accumulation of butter stocks need not have taken place. The same thing happened in connection with the wool market. There were 2,000,000 bales of wool stored up, including 900,000 bales held in Australia. They could see what the result would be if they allowed the whole of that wool to go on to the market. It would demoralise it. He grew a little wool himself, and he could give his own experience as to the value of having an advisory board in wool. At first he was offered 2s. 0½d. for his fleece wool, and one year later he was offered 5d. per lb. for the same class of wool off the same sheep. "Bawra" was then formed, and he came under the regulations of "Bawra." By means of scientific selling, which simply meant putting the wool on the market as the market could absorb it, he got 1s. 4½d. and 1s. 5¾d. for the wool he was previously offered 5d. for. If they had an advisory board they could deal with their accumulation of stocks in dairy products in the same way. They could adopt scientific selling in the same way as "Bawra" had adopted it for wool. They had four avenues of production in Queensland—wheat, wool, butter, and meat. They knew where they were with regard to wheat and wool, but they did not know where they were so far as butter and meat were concerned. If they had a board they could apply their energies to dealing with the accumulation of stocks. He had much pleasure in moving the motion.

A VOICE: You cannot apply wool conditions to perishable articles.

Mr. McANALLY said he was quite aware of that. He did not say that they could keep butter for two years in cold storage and then put it on the market in as good condition as when it was first stored. Each industry must be controlled by its own conditions.

The London Market.

Mr. E. W. WITTON (Chairman of the South Burnett Co-operative Coy.) seconded the motion. It gave him great pleasure to support the motion in favour of the establishment of an advisory board. A meeting of dissatisfied dairymen had recently been held at Murgon, and amongst other resolutions was one in favour of the establishment of an advisory board. The dairymen at that meeting also carried a resolution, which read—

"That our delegates to the Premier's Conference be instructed to embrace any opportunity of furthering the interests of our industry."

The meeting also carried a resolution which read as follows:—

"That a conference of co-operative directors and delegates appointed by suppliers be called for the purpose of bringing into being a co-operative advisory board."

That resolution was passed six weeks ago, so it showed that the dairymen were in favour of the board being brought into existence. His experience, and the experience of others engaged in the dairying industry, was that they could deal fairly well with the production part of the business, but directly the butter left their control to a certain extent it was forgotten, and when it hit London it arrived in a most friendless condition. (Laughter.) If the Government could give them some assistance by oversight of the butter when it reached London they would be doing the dairymen a great service. He was not a party political

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man, as he was a farmer, but he hoped that Mr. Fihelly would devote the ability which he possessed to taking charge of the butter when it arrived in London in a friendless condition. (Applause.)

Mr. H. M. STEVENS (*Rosewood*): It was ridiculous for Mr. Witton to talk about the butter arriving in London in a friendless condition when they all knew that they had in London an organisation of the whole of the co-operating and marketing agencies of Australia, New Zealand, and South Africa competent and willing to look after all their business if they would only entrust it to them. (Hear, hear!) That organisation in London had been hounded down by speculative operators in London, and Australia also. There was an article in the "Sydney Mail" of 28th February attacking the federation and quoting figures in order to damn it and trying to induce the farmers to withdraw their support from it. Unfortunately, the dairymen and co-operative companies in Queensland and Australia aided and abetted the speculators by handing over their produce to them to manipulate and control the market in any way they liked. The federation were absolutely competent to control all the business, and it seemed lamentable to him to hear a chairman of a co-operative company coming there and invoking the aid of Government assistance. He was glad to hear that the Government were sympathetic to the farmers. They were asked to let bygones be bygones, but it was absolutely impossible for them to forget the treatment they as producers received from the Government of Queensland in years past. They well recollected that one of the first acts of the Government was to arbitrarily fix the price of butter without any reference to the cost of production at all. At that time it was costing 3s. 6d. to manufacture 1 lb. of butter, but the price was fixed by the Government at something less than one-half that price.

Mr. McANALLY pointed out that Mr. Stevens was out of order. They had come there to listen to reasons for appointing an advisory board, and Mr. Stevens was not discussing the question.

The CHAIRMAN: He should discuss the question broadly.

The PREMIER: It seems to me that, whatever happened in the past and whatever mistakes were made, we should find some way of using our intelligence to arrive at a better system now. (Hear, hear!)

Control of Marketing Operations.

Mr. H. M. STEVENS: He congratulated the Government on the fact that they came to the conclusion that the producers were worthy of some consideration and that the Government were not going to insist on making them squeal. (Hear, hear!) The Premier referred to the necessity of financing the advisory board, and magnanimously offered to finance the board for the first twelve months. Already the Government had deprived them of ten times the amount of money necessary to finance any advisory board for very much longer than twelve months, so that if the Government were inclined to make any restitution it would be a mere act of justice only. He was very pleased to hear the Premier's remarks to the effect that capital was not necessary for the farmers to conduct their own marketing operations. That was a bugbear that they found brought up on every possible occasion by the speculators and those who wished to continue to have control of their marketing operations. They were constantly told that it was impossible for them to market their own products while they (the large operators) had ample funds at their disposal. He had maintained for years past that if they would only unite—if considered advisable, have an advisory board—they had the remedy in their own hands. They had the produce. As the

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Premier had remarked, the dairying industry was worth £7,000,000, and with that money what need had they to go cap in hand to the London speculators, the London merchants, or to anyone else? They had their organisations already established, and all they had to do was to hand their produce over to them instead of handing it over to the speculators. They had the matter fixed so far as marketing in the old country was concerned, and he was pleased to know that Mr. Trehearn had gone to the old country in order to link up the Canadian and United States farmers with their organisations, so that they would have a continuity of supplies throughout the year on their own floor space. (Hear, hear!)

Mr. WIGHT (Farmers' Alliance): While he quite agreed with the object of the resolution, he thought it would be inadvisable for the Conference to appoint the members of the advisory board. He would therefore move as an amendment that the words "by this Conference" be deleted, and later on he intended to move an amendment to paragraph (6)—"Constitution of the board"—to provide that it was absolutely necessary that some alteration should be made in the system of marketing their butter in London to-day. They were told that the Wholesale Co-operative Federation met the requirements of the producers; but even the representatives on the various boards of directors could give them no assurance that their butter was now being marketed direct to the retailers through that federation. It seemed to him, from the information available, that the Co-operative Federation was simply another link in the long chain of middlemen that stood between the producer and the consumer. The boards of directors of the different dairy companies had no direct control over the operations of the federation, although they had it indirectly through their local distributing office. He would point out that the agenda paper made no provision for immediate relief of the conditions under which the farmers were suffering to-day, and he had certain proposals to make which he would like to outline. He put them forward on behalf of the Farmers' Alliance. They were:—

"1. That the Queensland Government introduce legislation at the earliest possible moment for the formation of a butter pool (compulsory).

"2. That an advisory board be elected and constituted as follows:—

- (a) Three members to be elected from the dairy companies' associations;
- (b) Two members to be drawn from the rank and file of the cream suppliers, nominations for which will be called and selection made by the Government;
- (c) Two Government representatives;

making a total of seven members.

"3. That all butter produced in Queensland shall be controlled by the advisory board with a view to stabilising prices, and, if the Constitution permits, provision shall be made to prevent imports from other States cutting the local price.

"4. The wholesale selling price shall be based upon production cost, and, until accurate figures are available, 1s. 7d. shall be regarded as the cost to the cream-suppliers of producing the quantity of cream necessary to manufacture 1 lb. of butter.

"5. That the Government establish a distributing floor in London for the marketing of Queensland dairy produce, the floor to be controlled by the producers under the supervision of the Queensland Agent-General's Department."

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He understood that it would be possible to make a provision to prevent butter from the other States cutting under local prices by a Proclamation under the Sugar Acquisition Act. In 1915 a Proclamation was issued commandeering cattle within the State, and by a Proclamation butter also could be made a commodity to which that Act would apply. The farmers to-day were looking to Heaven for some speedy redress. If an advisory board were appointed it would be some considerable time before it could be put in working order and in a position to remove the grievances in the industry which called for immediate relief. They could not wait three months for relief, and by the time the advisory board could deal with the matter some of the farmers would be amongst the ranks of the unemployed. He wanted to obviate that. There was no doubt that the older farms, owing to the construction of railways, were more valuable now. The value had increased 1,000 per cent. in some cases so far as the land value was concerned. He knew of many farmers who bought land in Queensland at £1 an acre 25 years ago who had sold out at £25 an acre.

The CHAIRMAN intimated that Mr. Wight had exhausted his time.

Mr. WIGHT: There was one point he wished to make clear. It would be very unwise for the Conference to appoint the board to-day. It should be left to the organisations in the dairying industry to appoint their own delegates, otherwise they would probably not get intelligent representatives. (Laughter.)

As there was no seconder of the amendment, the amendment lapsed.

Mr. RUDD (Terror's Creek Co-operative Dairy Coy.): As the Premier had stated, the dairymen were a community without any status to-day. The Government and previous Governments were responsible for that position to a very large extent. He took it that a man's status was summed up by the amount of money he had in his pockets or in his banking account. That being so, he would suggest that there was an easy way to put them in the position where they would have some status in the community, when they would not be looked upon by their city cousins as serfs of the community any longer. He was not finding any fault with the Government. They all blundered at times. But if in 1919, through the Price Fixing Commissioner, the Government took money from the industry, the least the Government could do to relieve the distress in the industry to-day was to subsidise the output. That was the only immediate relief that was possible. He could safely say that, in his own district, the people wanted to give up the cows and become factory employees, as they could not pay their ration accounts with the present price of cream. If the Government were sincere they should give relief for the next six months by subsidising the output by 1d. per lb. If that were not done, returned soldiers and others in his district could not hold out any longer, as their credit with the local store-keepers was exhausted, and there would be nothing for them but to leave the land. That would be a national calamity. If the Government agreed to such a subsidy they would not be giving the dairymen any "sop"; they would only be giving back something that was taken from them.

As regards the advisory board: He would like to have seen such a board selected by the co-operative butter factory associations. The Premier said it was necessary to have brainy business men on the board, but they must also have men possessed of co-operative principles. It was no use getting brainy business men who were not in favour of co-operation. He was sorry to read that the chairman of one co-operative factory in Queensland had advocated selling their surplus to speculators. They did not want a man like that on the board. They must be careful in selecting the advisory board, otherwise they would be doing the worst possible thing. Any man who advocated selling their

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produce to speculators was an enemy to the co-operative movement, and they should be careful to see they were going to build up their business and not break it down.

Mr. N. C. HOPPER (Cooranga North Co-operative Cheese Coy.) moved the following amendment:—

“That an advisory board for the dairying industry of Queensland and its objects be considered by this Conference, and that, if decided on, it be elected by the whole of the shareholders of the butter and cheese companies in Queensland.”

If the motion was carried in its present form it would tie the Conference down to selecting a body of men who, if they had time to think, they would probably leave out in the near future. It was only right to the dairymen of Queensland that the matter should be referred to every shareholder in the butter and cheese factories in the State. They should get the best brains obtainable.

Mr. CARMODY (Gin Gin District Dairymen's Association) said he had much pleasure in seconding the amendment, as he was of opinion that the dairymen collectively were not truly represented in the Conference. His district strongly supported the appointment of an advisory board, but they needed to be very careful in its constitution. He thought the Government were very lenient in asking only for two representatives on the board, to which he thought they were justly entitled; but being the most democratic country in the world they should consult the suppliers as to who should be their representatives on the board. He welcomed the chance given to them to-day to do something concrete. He said he strongly resented some remarks made before the Price Fixing Commissioner by one lady, who stated that the dairymen out in the country were killing and starving the young life in the city by asking an extortionate price for their milk and butter. He was a worker, and he had never worked harder in his life than he did to-day. There were hundreds of women in the country to-day, who, even on the eve of maternity, were milking cows in all sorts of weather, in order to try and make ends meet. On behalf of his district he would give the advisory board his hearty support.

The PREMIER: It was in the hands of the Conference as to whether they constituted an advisory board and appointed it forthwith from the Conference, or arranged for the election of the board by all suppliers in Queensland. It was quite immaterial to the Government which course was adopted. It would be more democratic to consult every supplier in regard to the constitution of the board. There was only the question of the delay which was involved, which seemed to him to be rather material. The Government desired the advisory board to be appointed, so that it could get to work straightaway. They could not ask the Government to put any plan into operation until the advisory board had formulated a policy. That was why the Government wanted the board appointed quickly, but if the Conference thought that it would get a more satisfactory board by deferring the election it could decide accordingly. (Hear, hear!)

Mr. G. GRAHAM (Esk Co-operative Factory) referred to the scheme suggested by the Commonwealth Minister, Mr. Massy Greene, in regard to which the suppliers in his district were unanimously agreeable, and he took it that the advisory board now suggested was as near as they could get to Mr. Massy Greene's scheme for the present. There would, therefore, be no necessity for him to go back to the suppliers for their approval. As they were there with the confidence of their suppliers, and most of the directors there were

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suppliers, it would be a waste of time to refer the matter back to them. That was why he was against the amendment. It would be a pity not to establish some scheme, but he did not think it would be possible to get a good advisory board unless they went in for true co-operation. If they got the cream and cheese suppliers, there was no need to go outside for an advisory board, because they were the most capable men in the industry. The farmers were afraid of legislation, because they did not know where it was going to land them. It had been said that the farmers worked 16 hours a day, and they wanted to get that altered. The farmers did not work 16 hours a day when they deducted the meal hours and time for "smoko." Every farmer knew what work was. He did not go in for farming for the fun of the thing, but he wanted to make his industry pay. At present, he knew of farmers who had their sons working at other occupations near their fathers' farms, and the son was getting more than the farm was returning. In addition, the son had an eight-hour day. He had been dairying for years and used milking machines, and he could not make his dairy pay at the present time. They were not sticking to dairying to get only 8½d. They knew that the markets would fluctuate and they would get more in time, but they could not make their sons see that. They wanted to work for a big co-operative system so that they could finance the industry for themselves.

Mr. W. T. HARRIS (Queensland Co-operative Butter Manufacturers' Association) agreed with the Chairman that they should let the dead past bury its dead. The Government may have hit them, but they had also hit the Government hard in years gone by. It was only a question of hitting a man hard enough to knock him out. If they hit him in a vital part they would get him in the end, and he thought that that was what they did to the Government. They had got a knockout. They were now in a position to start afresh. He suggested that a vote be taken on the amendment.

The CHAIRMAN asked if they were satisfied that sufficient time had been given to the discussion of the amendment, and received an answer in the affirmative.

The amendment was then put and declared lost, only five or six voting in favour of it and the others against.

Mr. J. A. AUSTIN (President of the Queensland Farmers' Union) congratulated the Premier on calling the Conference, as much good would result from their deliberations. The dairymen were seized with the gravity of the situation at the present time, and for some years past they knew the difficulties they had to contend with. Now, at the psychological moment, the Premier realised that there should be a reclamation and a reconsideration of the whole position. As a result of the Conference they should be able to bring the dairying industry to the position it should have occupied long ago. They should make it one of the most profitable industries in the State. In the past the various dairy companies' associations had been the advisory boards for the dairy producers, because they were their elected representatives, and as they were in touch with the various suppliers they were able to know their ideas and were able to advise them. Whatever mistakes had been made in the past they did not want any conflict to-day. He was not *persona grata* with many of the dairy companies to-day, but that did not prevent him from making a fresh start. In the past they had been the victims of circumstances and they were bound by the conditions which existed at the time. With an advisory board they could make a fresh start, and, although errors might occur at the start, it would be for the benefit of the dairymen in the long run. The dairy industry should move forward on the path of progress, and whenever they had an opportunity

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of helping it along they should seize that opportunity and do all they could to assist it. He was glad the Premier invited the primary producers to meet in conference. From the men gathered there that morning, he was sure they could elect a suitable advisory board to control the industry. He had much pleasure in supporting the proposal to form an advisory board.

Mr. W. PURCELL (Downs Co-operative Dairy Company, Limited) said he had much pleasure in supporting the motion. He was thoroughly in accord with the suggestion that the advisory board should be elected by the meeting assembled that day. The Premier wisely suggested that the Conference should assemble as early as possible, and that was why they assembled at short notice. As they had a representative gathering, they could elect the board. If they left it to the shareholders they would not get a better board than they could elect themselves that day. The men who were elected to the various boards were well represented that day. They were not elected on their local boards because they were the worst men, but rather because they were the best men in the district, and for that reason he thought they should elect the board that day. He had been president of the Cheese Manufactories' Association for five years, and he appealed to the cheese factory representatives, and also to the butter men, to carry the proposed scheme as it was submitted. They could improve it later on if necessary. They could not go on as they were. They were up against it. Someone said they had not a "bob." He for one gave his last cheque to the "kids." God knows they had to do something. The Government had been good enough to suggest something that would be of benefit to the industry, and they should look at it like broadminded, sensible men, jump at it and hold on to it with both hands. (Hear, hear!)

Mr. SKERMAN (Kaimkillenbun Co-operative Cheese Factory): He had great pleasure, on behalf of the company he represented, in supporting a motion that definite action be taken in regard to the supervision of the industry. It was apparent to all, by the speeches that had been delivered, that they were in a forlorn condition, and something must be done to save the industry and save the country. If the dairying industry was to be carried on as at the present time, the country must become poorer. There would be no extension in settlement, and those people already settled on the land would not be able to retain their holdings. Something must be done to give an impetus to settlement by providing for a reasonable return for primary products. It had been suggested that an advisory board be appointed provisionally for twelve months. During that time it could be knocked into the shape required. He was a son of a pioneer and had worked continuously on the land, and to-day he had to work, and his experience was the experience of many others. One factor that militated against success on the farm was the transport of their cream from the dairy to the factory. They talked about marketing their produce, but in many cases they had a product that was not worth marketing. The condition of that product was brought about, not through any fault of the factories or through any fault of the dairyman, but through not being able to get the cream from the separator to the factory within a reasonable time. A great quantity of the cream in Queensland had to stand from four to seven days from the time it left the separator until it was manufactured into butter. Under those conditions how was it possible to make a first-class butter in a climate like that in Queensland that would compare with Danish butter? The railway system wanted improving vastly if they wanted to improve the condition of their product. They should be able to get their cream to the factory quicker. In 90 per cent. of cases when the cream left the farm it was first quality, but it was second and even third quality when the factory manager had to handle it. Therefore, he would exhort

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the Government to try and bring about improved means of transit, as at the present time the settlers in the outlying districts lost 25 per cent. of their income.

Mr. WINNETT (Southern Queensland Co-operative Dairy Company): He moved as an amendment—

“That an advisory board for the dairying industry of Queensland be elected, and that such board be elected by the directors of existing co-operative companies.”

That would meet the bill, otherwise there would be much discontent amongst the factories. The factories should have a chance of electing the representatives, and a time limit could be fixed so that if any factory did not send its vote in by a certain time it would lose its vote.

Mr. SHAILER (Memerambi): They all agreed that it was necessary to have an advisory board, but he did not think the matter should be rushed through that day. If the Board could be elected by the suppliers or factory managers it would be much better, but something should be done immediately to relieve the position. An advisory board would take weeks or months, and in the meantime, unless something was done, a great number of the farmers would have to leave their farms. In his district men—dairymen—had to send their cream in 40 miles to the factory, and then they only got 7d. per lb. for the commercial butter content of the cream. Milk in his district was worth 3¼d. a gallon delivered at the factory for cheese, and under those circumstances it was quite impossible to make a living.

Amendment put and lost.

A DELEGATE: We do not understand, if an advisory board is appointed, whether it will be compulsory or otherwise.

The PREMIER: There would be nothing compulsory in the scheme, except compulsion on the part of the advisory board to sit and consider the question. They would have to undertake immediately the consideration of the very problems now agitating the minds of those in the industry. If they did their work properly they ought to be able to formulate almost at once some scheme for the Government and those in the industry to act on. What would be done when they formulated their proposals would depend on the nature of the proposals. Suppose they recommended the formation of a pool. Then the industry would have to be consulted.

A DELEGATE: Suppose one or two factories stand out?

The PREMIER: If the advisory board recommended a pool, before it was enforced the industry would have to be consulted; but if the advisory board recommended a pool and the industry supported the recommendation, then it would be put into operation.

Motion put and carried unanimously amidst applause.

OBJECTS OF THE ADVISORY BOARD.

Mr. W. T. HARRIS, secretary of the Queensland Co-operative Dairy Companies' Association, moved—

“That the objects of the advisory board include the following:—

- (a) To consider the question of investigating, in conjunction with the Department of Agriculture and Stock, the problems relating to the dairying industry of this State;

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- (b) To investigate the methods of production, manufacture, marketing, storage, and distribution of dairy produce;
- (c) To consider the question of the establishment of pools for dairy produce;
- (d) To consider the question of the co-ordination of the activities of existing co-operative companies;
- (e) To consider the question of the improvement of the productiveness of the individual dairy herds by general application of systematic herd testing or any other efficacious means.
- (f) To consider the question of the purchase of all factory and farm requisites through co-operative channels;
- (g) To consider the question of fodder conservation;
- (h) To consider the question of extending the benefits of the Co-operative Agricultural Production and Advances to Farmers Act, or any other means for the establishment of rural credit."

A Red Letter Day.

He congratulated the Government on calling them together on that occasion, which was a red-letter day in the history of Queensland dairying. Only a few years ago the whole of their butter was manufactured under proprietary auspices. The farmers then met together and subscribed capital to work the factories. Fully 90 per cent. of the butter in Queensland was manufactured to-day by co-operative companies. He claimed that the dairy farmer of Queensland was the most progressive farmer in Australia. The cheese associations and the co-operative dairying associations had done an immense amount of good not only to the dairymen of Queensland but to the dairy farmers in the other States. He claimed that the dairy farmers of Queensland were the only dairy farmers in Australia to control the price of their product on the local market. In pre-war days the farmers sent their stuff to their agents in Brisbane, who fixed the price, and the farmers had no say in the matter; but to-day the farmers themselves fixed the price of their commodity on the local market without consulting the merchants. That was the progress they had made, and that action had put into the pockets of the farmers in Queensland, in connection with butter sold in Queensland during that period, a sum of £98,000. A few weeks ago, when they found the merchants were giving discounts and attempting to break their markets, the dairymen got together again and laid down the terms upon which the merchants should do their business. They had consolidated their work as they had gone along. What they had done was going to be of lasting benefit to the industry. In Queensland they were taking a forward move to improve the quality of their production. One of the first functions of the proposed advisory board would be to ask the Government to take steps to enable the Railway Department to build a larger number of railway trucks suitable for the carriage of butter. The farmers were endeavouring to improve their article, and the advisory board would ask the Department to help them to keep their product good.

The Marketing Problem.

The question of marketing was a big problem. There was not a butter company in Queensland which was satisfied with the present method of distribution of their products in the markets of the world. He had seen Queensland butter going into store in London in a poultry shop, where they never sold a

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pound of butter, and coming out three or four doors away in nice Dorset rolls and Devonshire pats, which showed that if they made a good article it would sell; but they were not selling their butter at the other end in a proper manner. They had sent their butter to the merchants and let them do what they liked with it. As dairy people they objected to the Government going on with the Hamilton Cold Stores, which they thought was a mistake, but the farmers had made a greater mistake in not going on with their own works. As bad as they thought the Hamilton site was, it was better to have a cold store somewhere in which to store their butter, instead of leaving it for four or five days in the railway trucks.

The PREMIER: The advisory board, if it had been in existence, would have been consulted about the site for the cold stores and such matters as that.

Mr. W. T. HARRIS was glad that the board would be consulted in those matters.

The CHAIRMAN: That is one of their functions. I do not want to stop you, but you have exceeded your time unless the meeting grants you an extension.

[*A motion was formally passed granting Mr. Harris an extension of time to finish his speech.*]

A Dairy Pool.

Mr. W. T. HARRIS: Another object of the board was to consider the question of the establishment of pools for dairy produce. They had been devoting their energies in that direction for some time past, and they had been trying to get the dairy farmers in the other States to come forward and join a Commonwealth pool. In Queensland, they had advocated in season and out of season the formation of a compulsory Commonwealth pool, but they were informed by the Commonwealth authorities that it would be unconstitutional to grant a Commonwealth pool. That being so, it remained for the Queensland dairy farmers to form a Queensland pool. Although he had always been an advocate for a pool, he knew that they had not been the success they at first anticipated.

The CHAIRMAN: Did the Commonwealth Government refuse to grant you a Commonwealth pool?

Mr. W. T. HARRIS: Yes. The Commonwealth authorities refused to grant it on the grounds that it interfered with State rights.

The PREMIER: They would have as much authority to grant that as to form a Commonwealth Wheat Board.

Mr. W. T. HARRIS: When they made application they were informed by Mr. Massy Greene and Mr. Rodgers—the Ministers concerned—that a Commonwealth pool could not be formed. Although he believed in a voluntary pool for the Queensland primary producers, he thought they should go neck or nothing for a compulsory Commonwealth pool. He thought the lines laid down by the Minister as the objects of the advisory board were all that they could desire. He noticed that the board was to consider the question of the purchase of all factory and farm requisities through co-operative channels. That was a business proposition, and was one which would help the farmers. When the farmers bought individually they had to pay through the neck for everything. He remembered twelve months ago that the timber merchants wanted 3s. 6d. to 4s. each for boxes, but when the co-operative company made the arrangement they were able to get 250,000 boxes at 3s. each, thus effecting a saving for the farmers of something like £6,250. In connection with the purchase of machinery, the

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Maryborough factory was able to purchase a boiler for £300 less than if the purchase were made by an individual. It would be an economical proposition for the advisory board to buy all requisities for farmers. He knew, as secretary of the Dairy Companies' Association, that he could purchase cans and separators for 25 per cent. to 30 per cent. less than the market rates ruling at present. He had much pleasure in moving the resolution he had just read.

The Greatest Forward Movement.

Mr. McANALLY expressed his pleasure in seconding the resolution. He was pleased that the meeting decided to elect an advisory board, and he approved of the objects set out in the motion. Their position had been considerably advanced by that Conference, and that day would be a red letter one in the history of the primary producer. They had progressed considerably, in that they were able to induce the head of the Government to come down amongst the farmers and talk to them at first hand on questions which most affected their industrial welfare. (Hear, hear!) It was the greatest forward movement that the farmers of Queensland had been able to make up till the present time. He did not agree with Mr. Harris about the Danish butter, as he considered the Danish butter should be given first preference, but the Australian butter came a good second. (Hear, hear!) The Danish butter, however, was put on the market under one brand, whereas the Australian butter was put on the market under 453 brands. They would have to alter that. All that the producers asked for was fair justice. In the case of wheat, the farmer got his 5s. or 8s. per bushel. The miller passed it on to the baker, and the baker to the consumer, and the consumer in turn got an increase of wages at the Arbitration Court, so that everybody benefited, and everyone got fair justice. They had converted Mr. Gillies to their way of thinking long ago, and now they had converted the Premier. (Laughter.)

The motion was put and carried unanimously.

ADMINISTRATION.

Mr. J. H. KESSELL (Gladstone): The next motion was a formal one. He moved—

“(3) *Administration*: That the advisory board shall be given authority to appoint an administrative staff consisting of a manager, a business expert, and such other skilled investigators as may be considered necessary by the board.”

Mr. ANDREWS seconded the motion, and it was agreed to.

LEGISLATION.

Mr. J. A. AUSTIN moved—

“(4) *Legislation*: That if necessary the advisory board shall be invested with statutory authority, and in such case the board shall advise as to the authority necessary.”

Mr. BERMINGHAM seconded the motion, and it was agreed to.

*Report of Proceedings of Dairy Conference.***FINANCE.**

Mr. HOPPER moved—

“(5) *Finance*: That during the first twelve (12) months of its existence the cost of the advisory board shall be defrayed by the Government; that thereafter the scheme shall be financed by contributions from individual suppliers in the industry; and that the rate of such contributions and the manner in which they are to be collected shall be determined hereafter.”

Mr. RUDD seconded the motion.

A delegate drew attention to the wording of the resolution, which stated that the Government would finance the scheme for twelve months. Would the Government require two representatives on the board after twelve months?

The PREMIER pointed out that after the board was in operation it might be considered advisable to continue the Government representation on the board. The Agricultural Department would be prepared to render any assistance that was necessary even after the expiration of the first twelve months. The usefulness of the advisory board would depend on the men appointed. The Government would act generously to the board, and would continue the financial assistance after the twelve months if necessary. They would, no doubt, desire to have the best business men on the board, and if they got the best brains and the men with the most ability they would have to pay them well. It might cost £5,000 for the first year, but whatever it was the Government would assist them financially. They could consider the question of further assistance at a later date.

Mr. GRAHAM said that the motion stated that contributions would be made by individual suppliers, and he asked what that covered.

The PREMIER: His interpretation was that it might be advisable to levy a small sum like one-eighth of a penny per lb. on butter-fat supplied to butter factories, and one-sixteenth of a penny per gallon on milk supplied to cheese factories. That would be following the same policy as was adopted with the Cane Price Boards. There was a levy upon every ton of cane harvested. That was the fairest kind of contribution they could have, and those who contributed did not feel it, although in the aggregate it provided a very large fund indeed.

A DELEGATE: The motion should read “such contribution from suppliers” instead of from “individual suppliers.”

The CHAIRMAN: If there was no objection he would cut out the word “individual.”

The motion, as amended, was carried unanimously.

CONSTITUTION OF BOARD.

Mr. HOLTON moved—

“That the provisional Advisory Board shall consist of seven members, of whom five members shall be appointed by this Conference and two members by the Government.”

Mr. PENDER said he had much pleasure in seconding the resolution, as it was only proper that the Government should be represented on the board. The Government had in its employ as dairy inspector probably one of the ablest men in Queensland, and that gentleman's advice would be very helpful to the board. Mr. Graham was a very able officer, and his assistance would be very

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useful to the board. Many years ago he was present at a conference held in Parliament House when Mr. John White was Minister for Agriculture, and the delegates at that conference unanimously agreed that Mr. Graham should be placed at the head of the department.

The CHAIRMAN: There was no doubt but that Mr. Graham would be one of the Government nominees. I appreciate what you say regarding him.

Mr. JAMES PURCELL: First of all he would like to congratulate the Premier on his very able address. So far as the producers were concerned, it was the most hopeful address given by any Premier in any State in the Commonwealth of Australia. (Hear, hear!) They all congratulated the Premier on his very fine address, and he was very hopeful that some great good for the dairying industry would come out of it. He would like to remind the Conference that there were three great branches in the dairying industry represented at the Conference, and if the Conference were going to vote in a body for those representatives there were some branches of the industry that would be left out. He would ask the Government to agree to have one representative on the board instead of two, and that they give the butter interests three representatives, to be nominated by the people in the industry; that they give the cheese people two representatives, to be elected by the people in the cheese industry; that the Government have one representative, and that they give the condensed milk industry one representative.

The PREMIER: You need not cut down the Government representation—you can increase the number of members on the board.

Mr. JAMES PURCELL: It was very necessary to keep the number down. Each branch of the industry should have representation in accordance with the importance of the branch. He therefore moved—

“That the board be constituted of seven members, three to be elected by the butter people, two by the cheese people, one by the condensed milk people, and one by the Government.”

The CHAIRMAN: I take it that Mr. Purcell intends that this Conference shall proceed with the election?

Mr. J. PURCELL: That is so.

The CHAIRMAN: If that is so the Government are prepared to accept the amendment.

A DELEGATE: In regard to the representative from the condensed milk people—would he represent the proprietary companies or the co-operative companies?

The PREMIER: The representation would really be from the suppliers, because it was a suppliers' problem they were considering, and not the proprietary companies' problem.

The CHAIRMAN: We should lay it down clearly that the representative of the condensed milk people is a supplier.

The PREMIER: If there was any danger of the proprietary companies being represented and thus dominating the board, it might be necessary to state that the member must be drawn from the milk suppliers.

Mr. McANALLY: He did not agree with Mr. Purcell, as his motion seemed to bring in a spirit of antagonism between the two interests. He did not see why they should not allow the motion as originally on the paper to be

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passed. In a dry time very many of the cheese factories had to close up altogether, and the suppliers were forced to send their milk to the butter factories. They had met under the co-operative principle, and why could they not all combine?

Mr. BURTON (Wyreema): He thought Mr. Purcell's suggestion was a very wise one, as it would remove any possibility of bias. He was pleased that the matter of a representative being elected to represent the condensers had been brought up. He really represented 150 suppliers to the condensers, and he had no desire to be on the advisory board; but he should like to have someone on it, and he did not think any trouble would be caused in regard to the representative being in proprietary interests, because it would be a supplier who would be on the board, and not a member of the proprietary company. Whilst he was speaking, he would like to thank the Chairman and the Premier on behalf of the suppliers whom he represented for calling the Conference together. He might not have another opportunity of assuring the Chairman and the Premier that the dairying industry was in a very bad way. Those delegates present were mostly men who had made good. Perhaps they had had their properties left to them by their parents; but behind those gentlemen there were a lot of people in the country with ruin absolutely staring them in the face, and he commended very strongly the action of the Government in calling the Conference together.

Mr. MICKAN (Kingaroy): Mr. Purcell had asked for three representatives from the butter industry, and in electing those three representatives they should elect them in such a way that the different sections of Queensland would be represented. In 1918-19 and 1919-20 the output of butter from the various Downs districts represented 17 per cent.; output below the range and South Coast amounted to $29\frac{1}{4}$ per cent.; and for the North Coast and far North the output represented $53\frac{3}{4}$ per cent. He thought that that pretty well proved that the representation should be by district.

Mr. WIGHT (representing the Farmers' Alliance): He believed that the success of the advisory board rested in the election of its members. He thought it would be impossible for the meeting to elect the members of the board satisfactorily, because they were unacquainted with one another, and the dairy and butter producers' associations, and the producers themselves, should have an opportunity of saying who should represent them. He wished to move the following amendment—

“That two members be elected from the dairy companies' association; one member from the cheese companies' association; two members to be drawn from the rank and file of the cream suppliers, nomination for which will be called and selection made by the Government, and two Government representatives, making a total of seven members.”

The CHAIRMAN: He could not accept that amendment, because the Conference had already affirmed the principle of the Conference electing the board.

Mr. G. GRAHAM thought that the milk suppliers to the milk factories should be represented. He was speaking for Nestle's at Toogoolawah and the Toogoolawah Dairy Farmers' Association. Up there they paid on the butter fat; it did not matter to the factory where the farmers were getting their milk from. It was not a matter of proprietary companies, but of suppliers.

Mr. STAFFORD (Standard Dairy Company) said he did not see why the election of members of the board should be confined to suppliers if a company had been doing a good thing for the country in building up a good business. A supplier or a member of a proprietary company should be eligible.

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Mr. PURCELL moved an addition to his motion—

“That the representatives of the butter, cheese, and condensed milk branches of the industry, respectively, meet separately to elect the members of the provisional Advisory Board referred to in Resolution No. 6.”

Amendment agreed to.

Motion, as amended, put and passed.

The CHAIRMAN: The next thing was to arrange to carry out the election.

The PREMIER: They had really agreed on the principle of sectional representation on the Advisory Board, and the particular sections to nominate representatives. He suggested that the representatives of the butter, cheese and condensed milk industries, respectively, should meet separately to elect representatives of the provisional Advisory Board referred to in resolution on agenda paper.

Mr. J. A. AUSTIN suggested that the election be held at once, and that they should separate for half an hour.

Mr. HOLTON endorsed the suggestion.

The Conference then adjourned until the election of members of the Advisory Board had been disposed of.

The Conference resumed at 4.30 p.m.

The CHAIRMAN announced the result of the voting, and stated that the Advisory Board would be constituted as follows:—

Butter representatives: Messrs. W. T. Harris, T. Flood Plunkett, and W. E. Dean.

Cheese representatives: Messrs. William Purcell and Henry Keefer.

Condensed milk representative: Mr. G. Burton.

The CHAIRMAN said he would like the members of the Advisory Board to meet him after the Conference had concluded, as he had a number of matters to discuss with them. He would provide them with a room at the Agricultural Department, and, if necessary, they would also be provided with a temporary secretary. It was necessary that they should get to business straight away.

GENERAL BUSINESS.

The CHAIRMAN said he did not know if any member had anything further to bring before the Conference. He would like to know if members wished to sit after the tea adjournment, or if they would like to continue their deliberations on the following morning. If they had no further business, he would call on the Premier to address them on the organisation of the agricultural industry generally and the policy of the Government regarding agricultural matters.

Mr. HOPPER said the Premier invited them to bring forward any matters after the business on the agenda paper had been disposed of, and there were one or two small matters of vital importance to the cheese manufacturers which might be ventilated. Speaking of the cheese manufacturers on the other side of Toowoomba, he thought they should be given better facilities for the

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marketing of their products. Cheese was sent by rail to Brisbane from Bell and Kaimkillenbun, and in order to see in what condition the cheese was delivered in Brisbane he paid a visit to Foley Bros. He found that the cheese had to be put in dirty railway trucks at both Bell and Kaimkillenbun, and in addition the trucks had bolts protruding 1 in. to 1½ in. from the floor of the trucks. The result was that the marks of the bolts protruded into the cheese, and, in addition, the dirty floors meant a deterioration of the cheese of from 10 to 20 per cent. He hoped the Premier and the Chairman would see that the Railway Department gave this matter serious attention in the interests of the primary producers. He thought it was a matter the Advisory Board should go into as soon as possible. He thought they should approach the Government to provide properly insulated trucks for the cheese manufacturing districts, so that their produce could be marketed in good condition. Anyone looking at the cheese from Toowoomba would see that it arrived in good condition, while that from Bell and Kaimkillenbun was a disgrace. The Dairy Act passed by the Government was one of the very best dairy Acts ever passed in Queensland, but they should not force it on to the primary producers without helping them financially to carry out its provisions. It would be a big burden on the primary producers unless they were given some financial assistance. The Government had State sawmills, and they could help the primary producers in adopting a standard box for all dairies.

The CHAIRMAN pointed out that Mr. Hopper's time had expired.

Mr. J. PURCELL thought that the matters raised by Mr. Hopper could well be left to the Advisory Board, as they were the very matters that the board were appointed to deal with.

The CHAIRMAN said that he had met Mr. Hopper on his farm, and he knew that he was a hard-working primary producer, but he thought his ideas could better be taken up by the Advisory Board. They could make recommendations to the Government, and those recommendations, coming from such an organised body, would receive every consideration from the Government.

Mr. HOPPER accepted the suggestion made by Mr. Purcell, and said he would take the matter up with the Advisory Board.

Mr. KESSELL thought that the delegates would like to hear the remarks of the Premier.

MR. THEODORE'S SCHEME FOR ORGANISING THE AGRICULTURAL INDUSTRY.

The CHAIRMAN: I have much pleasure in calling on the Premier to address you. (Applause.)

The PREMIER, who was received with applause, said he did not want the impression to be created that he wished to monopolise the Conference. But he had one or two ideas to put forward for their consideration. Full opportunity would be given for all their proposals to be brought forward. He hoped the Conference would not be terminated hurriedly before they had a full opportunity of discussing all the matters they had met to consider that day. What he wished to put before them was a scheme for effective organisation, which was the main concern of the agricultural industry. That Conference was the most representative dairy conference that had ever assembled in Queensland. It might not be the largest numerically, but it was the most representative conference of dairymen that had ever assembled. Therefore, he would like to put before them his scheme of organisation, which, in his opinion, was necessary before they could have an adequate solution of the problems with which they were confronted. They had elected an Advisory

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Board, but if they did not do anything further than that then they would have no better organisation than they had before. If that was all they were going to do, then the agricultural industry would be no better off than when they started. It was like attempting to build an organisation from the top downwards, instead of from the foundation upwards.

Basic Organisation Necessary.

They had an Advisory Board created, but they had not a basic organisation established. It was necessary to start in that way, because of the urgency of some of the problems, but they should be lacking in wisdom if they did not take the existing opportunity to establish a thoroughly effective organisation among the farmers in order to complete the scheme of which the Advisory Board was only a part. The Advisory Board must dovetail in with a complete scheme of organisation, and the Advisory Board in the dairying industry was, perhaps, not the only Advisory Board that might be necessary in connection with agriculture. He did not suppose they could find any branch of agriculture more disorganised or suffering worse disabilities at the present moment than the fruitgrowing industry of Queensland or of Australia, and if any branch of agriculture wanted an advisory board the fruit industry wanted it in all conscience. That was why he said they should only be doing part of the work if they were content with appointing an Advisory Board and allowed that Advisory Board to study the problems and let the work rest there. Every farmer ought to be organised into some form of farmers' association, the designation of which did not matter, but the form of constitution did matter. The farmers themselves ought to determine that eventually, but in order that the thing could be started, he had roughed out a scheme—just the skeleton of an organisation—in order that such a thing could be launched. It might be asked, "Why establish another organisation when the Queensland Farmers' Union was in existence, and the Farmers' Alliance, and various other organisations of that kind?"

The Wider Aspect of Agriculture.

There was a necessity for an organisation to deal with the wider aspect of agriculture and to co-ordinate the efforts of all farmers' organisations that were not party political organisations, and there was a necessity for an organisation which was broad enough to embrace every agriculturist and small grazier in Queensland, and it was necessary for that to be free of any party alliance whatever. It might be equally necessary at the same time to have, if they liked, Queensland Farmers' Unions and Australian Labour Party organisations in farming districts, or whatever other kind of party organisation they wanted for purely party political purposes. A farmer must have the same right to express his party prejudices or beliefs or preferences as any other member of the community, but it was essential that there should be an organisation free of that kind of limitation; free for everyone in the agricultural industry to participate in; and free to act in full co-operation with the Government, whatever Government might be in office—whether it was the existing Government or some other Government.

The American and Canadian Systems of Rural Organisation.

His ideas upon the matter had to a large extent been assisted by a study of the conditions relating to the organisation of farmers in Canada and in America, and one had to give consideration to the experience of those countries, who had advanced vastly farther in that respect than any other agricultural country in the world. The United States and Canada had through

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the organisation of the farmers and development of agriculture increased the status of the farmers farther than any other country in the world, and they in Queensland would be foolish to ignore the experience of the American farmers or overlook the benefits they had gained for themselves through that form of organisation. In America the organisation was known as The American Farm Bureau Federation. In every agricultural centre, large and small, in the United States there was a local farm bureau. It might comprise only twenty members, or it might comprise 1,000 members, each one of them farmers. Those were linked up with what were known as the County Federations. They had their State executives in every State, and they again were linked up with what was known as the Federation of Farm Bureaux, with headquarters at Washington. They employed a tremendous staff, and their revenues came from individual contributions from members all over the United States. They had a membership of 1,500,000 farmers, and their aggregate membership fees represented a very large fund. They employed the best expert agriculturists, educationalists, propagandists, and organisers that were to be got anywhere in the world, and, consequently, they were carrying on the most effective kind of propaganda and organising, and their influence was felt in an exceptional way in America. The organised farmers in America at the present time was the strongest organised section in America, and their influence was felt in every direction—in public movements, in the Legislature, in administrative matters, and they had the actual co-operation of the United States Department of Agriculture. In every large county and in every State they had what were known as the county agents. Those were expert agriculturists selected by the Department of Agriculture, and paid for by the Government, who were acting in constant co-operation with the farmers' organisation.

A Scheme for Queensland.

That organisation, which had been developed in the last two or three years only, had proved so successful, and had emancipated the farmers from so many wrongs and disabilities, that they would be foolish if they did not attempt some kind of organisation of that nature in Queensland. There was nothing to be lost by it. So section, no party, no authority suffered any loss because of the organisation of the farmers on those lines in Queensland. They were not doing any injury to anybody by doing that, but they were providing the farmers with the means to become articulate—to voice their opinions, their grievances, their wrongs, and by the force of their organisations to have their grievances adjusted, and also to have a basic organisation with which the Advisory Board and other authorities of that kind that might be established would work in complete unity and harmony. The idea he had formulated and which would be circulated was merely the arbitrary outline of a mere skeleton scheme. It did not represent the final word by any means. Nothing of the sort. It was a mere suggestion, and embraced the establishment of what he would call the Queensland Producers' Association. It would comprise local producers' associations in every centre where there was sufficient farmers to form one; those to be linked up in district councils of agriculture. One of the provisions was as follows:—

“In every district where farmers are enrolled, there shall be formed as auxiliaries to the District Councils of Agriculture and of the Central Council, Local Producers' Associations. Each sub-district may form Local Producers' Associations. (For example:—Assuming that a District Council were formed for the North Coast District, Local Producers' Associations might be constituted at Maleny, Montville, Flaxton, Mapleton, Buderim Mountain, Woombye, and other centres, with, say, the headquarters of the District Council at Nambour.)”

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In the Granite Fruit Belt, in the Stanthorpe District, there were about a dozen fruitgrowing centres. Each centre might have its local producers' association, each one linked up with the district council with headquarters at Stanthorpe. On the Downs, and in the various agricultural districts of Queensland, they could establish all those organisations correlated and co-ordinated and linked up with the Central Council of Agriculture, and the Central Council of Agriculture might be formed in this way. There must be a start somewhere, and this would be a provisional council.

"The first Council of Agriculture might be appointed by the Governor in Council, and should consist of twenty members, such members of the council to be appointed as follows:—

Fifteen members to be elected in groups according to the sections of the industry to be represented;

Five members to be appointed by the Governor in Council;

The Secretary for Agriculture to be president of the council, and other officers of the council to be elected by the council itself.

"This Council of Agriculture is to be the supreme authority in the Queensland Producers' Association.

"The objects of the council shall be to co-operate with the Local Producers' Association and the Department of Agriculture in—

- (i.) The development of the rural industries;
- (ii.) Investigating and dealing with problems relating to the rural industries;
- (iii.) Advising agriculturists with regard to matters which require scientific knowledge and training;
- (iv.) Research on subjects pertaining to the rural industries;
- (v.) Securing effective action for the controlling of diseases and pests generally;
- (vi.) The securing of additional markets for the disposal of produce and of improved means of distribution;
- (vii.) The securing of improved means of transport;
- (viii.) The watching of markets and the commercial side of the rural industries generally;
- (ix.) The general policy of standardising;
- (x.) Extending the usefulness of the professional staff of the Department of Agriculture;
- (xi.) Regarding matters in relation to agriculture which may be referred to the council by the Minister;
- (xii.) Generally, advising, assisting, and co-operating with the Department in all matters pertaining to the rural industries."

The Scheme Explained.

It might be asked how that would work in view of what they have done with an Advisory Board. He might explain that the general council of agriculture would be the supreme authority; but under it, and in close touch with the particular branch of industry with which it was concerned, would be the advisory

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boards. The advisory boards would be to some extent subordinate to the general council, but they would be charged with the duty of carrying out special investigations and exercising functions in their special branch of the industry. In these matters they would not be interfered with. Another advisory board could be appointed for the fruitgrowing industry, and the efforts of the advisory boards would, when necessary, be co-ordinated by the central council of agriculture. The whole of those organisations from the bottom to the top, through the local producers' associations, through the district councils, through the advisory boards, and through the central council of agriculture, would be farmer-controlled organisations. The Government would be represented on the advisory boards and on the central council, but it would only be represented by having some of its expert agriculturists on it and the Minister for Agriculture, whoever he might be, from time to time. That was in order to keep complete touch between the farmers' organisations and the department, which must work in hearty co-operation in order to make the best of their advantages. If in order to have the thing launched, the farmers themselves would express their satisfaction with an idea of that kind, the Government was prepared to convene, first of all, the central council of agriculture; to bring it into being the same way as the Advisory Board had been brought into being. He would like to get their assent to the council on those lines. The central council could be a provisional council for the purpose of getting the organisation formed. The provisional council would have to appoint a director and a number of organisers. The Government, in the same way as would be done with the Advisory Board, would finance initial operations for twelve months or so, until the organisation was fully established. When the organisation was established, it would then define its rules, draw up its constitution, determine the mode of control, and arrange its finance, and conduct its business without any interference from the Government or from any other quarter. (Hear, hear!) He would recommend that to their consideration. He would like to have their criticism or comments on it, or to answer any question they liked to ask. This was the scheme he touched upon on his agricultural visit to the Downs and below the range a week or two ago. Since then he had received many communications from various parts of the State endorsing that scheme. In one or two districts they had gone so far as to tentatively elect their organisers to put the scheme into operation. That was a good spirit, and, if that spirit was followed, an organisation of this kind would in twelve months be established.

Farmers a Force.

If they had an organisation of that magnitude effectively established, the farmers would begin to be a force in Queensland, which they were not at the present time. They would be able to speak to Governments, private companies, to the Commissioner for Railways, and the shipping companies, and whoever they had business with, in an authoritative voice. This was the best scheme he could formulate. Of course, the establishment of the organisation itself did not accomplish any reform, but when the organisation was established, it would, by the force of its own power and the brains and energy of the men controlling it, formulate schemes of more effective co-operation for the solution of the problems facing the industry, for the spread of propaganda, for the formulation of policies dealing with educational matters, and so on, and in that way it would effect reforms for agriculture. He was not pretending that the Government was acting as a Government quite impersonally in the matter; the State would get some benefit from an organisation of that kind.

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They hoped to make the conditions of agriculture more attractive to those who would become prospective settlers in Queensland. They hoped to get advice from such an organisation to assist them to solve problems relating to administration and settlement—the opening of land to settlement and the carrying on of the Agricultural Department generally. The Agricultural Department would gain immeasurably from the establishment of an effective organisation amongst the farmers, if the farmers would look at it in the spirit in which he was putting it forward. He commended it to their consideration, and invited them to speak plainly and frankly, and hide nothing. He would like to get a confirmation from this Conference, as representative of one branch of agriculture—and, perhaps, the most important branch of agriculture—of the necessity for the formation of an organisation on these lines. As he mentioned at the outset, the form of the organisation did not matter, the name of it did not matter; it was merely a question of getting it launched; it would soon evolve its methods of organisation and constitution without any outside direction. (Applause.)

The Scheme Supported.

Mr. P. K. POWER (Australian Dairy Farmers' Association): He congratulated the Government on the scheme they had put forward. If such a scheme had been established ten years ago, the country would not have been in the position it was in to-day; but these things could never come too late. The organisation he belonged to only started at the beginning of the year, and it was carried out on non-political lines, similar to the scheme which the Premier had outlined to-day. Up to the present, they have been very successful on the Burnett. They had all fallen in with the proposal, which was on non-political lines. He believed that, on non-political lines, there would be no difficulty in launching the scheme proposed by the Premier. The Minister had apologised for having hurriedly called the Conference together, but he (Mr. Power) did not think the honourable gentleman need apologise, because the Conference had come at a critical time, and could not have been delayed any longer, as there were many farmers in a precarious condition. The Minister had touched on the subject of herd testing, and improvement in that direction would make things better in the dairying line, but if they tested the herds and then culled them out, and sold the culls to other dairymen, it would not improve the herds generally. He thought the plan which the Premier had advanced was one which they should all fight for; it was what they had been fighting for in his own district already. For his part he was willing to help the Premier in any way he could in this matter.

Farmers in Sympathy with the Premier's Proposals.

Mr. DOUGLAS (Cooroy) endorsed what the Premier had said. He represented a dairy association, and there were fifty similar associations which had sprung up in Queensland, showing how much the farmers and dairymen were in sympathy with the scheme which the Premier had put forth. It was a question whether it would be wise to sectionalise the farming industry. It might be advisable for dairymen and those connected with subsidiary products of dairying to join together. They would then have a combined interest with which to go before the central council. The fruitgrowers might combine in

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the same way. The programme put forward by the Premier was similar to the policy of his association, which they had enunciated in a leaflet which they had issued. If the different sections of producers were united in their respective interests they would be able to bring weight-before the central council in regard to their needs.

Mr. HOLTON: He understood that the scheme outlined by the Premier would at once sweep to one side all existing organisations.

The PREMIER: No, not to sweep them aside but to absorb them if they are not party organisations.

Mr. HOLTON: He took it that there would be no room for any organisation outside this scheme. The main disability under which the farmer had been labouring, in addition to the want of unity, had been with regard to getting funds to carry on the associations. He hoped the Premier would indicate on what lines the necessary fees to carry on this association successfully would be obtained.

The Question of Sectional Organisation.

The PREMIER: Perhaps he had better answer these queries as they were raised. Two points were raised by the last two speakers—the question of sectional organisation; the organisation of the various branches in compartments, but co-ordinated under the central council of agriculture. That was the intention, although the scheme might not perhaps define it too clearly. It was merely a skeleton, and the provisional council would have to go into the question of drafting a constitution. If the organisation was established, the organisation itself would provide an effective and proper constitution. Anyone could see that they would have a top-heavy, ineffective organisation if they had the men concerned in fruitgrowing, wheatgrowing, dairying, and sugar-growing all combined together on the same board to deal with the details of those respective industries. They would not be interested in the same problems at all. Therefore, the various branches would be segregated for the consideration of their own particular problems, but they would all be linked up with the Council of Agriculture, which would look after the interests of the organisation as a whole. The dairymen must have their own authority controlling their own affairs, and the fruitgrowers likewise. The wheatgrowers would also deal with problems which concerned only themselves. But they would all be linked together in one central council of agriculture, and they would exercise a force as a united body of farmers and could be utilised as required.

Financing Preliminary Organisation.

With regard to financing, he realised the difficulty of launching such an organisation, because of the necessity of having considerable funds at the initial organising period. It was always a difficulty in launching a big organisation to get it going properly, because they might have to spend thousands of pounds before it would be properly established. As it was a semi-public undertaking, and as it was for the benefit of the State, he thought that the State ought to carry the initial cost of establishing the central council of agriculture. A staff would be appointed to direct the organisation. They would appoint organisers in the various districts, the organisers coming from among the farmers themselves. The Government

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would pay them for the first twelve months, and after that the central council would devise means for carrying them on. For a time it might be necessary for them to receive Government assistance even after the twelve months. In America they found it wise for the Government to grant financial assistance and pay the entire salaries of the county agents, and they also gave the organisation the use of their expert agriculturists. In fact, they were put under the direction of the organisation. The same thing ought to be done in Queensland. If they had experts in dairying or in stock, and the same with experts in fruitgrowing, experts in dealing with pests and disease, and so on, they could be put in the districts where they could be best used. Their services could be controlled by the district councils formed under this organisation. The American Farm Bureau levied their members to the extent of 50 cents, about 2s., a year. It was not a large sum, but it provided a big fund. It might be necessary to go further than that in Queensland, but they could devise a financial system which would enable their affairs to be carried on successfully. (Applause.)

The CHAIRMAN said that the scheme had been outlined by the Premier for the organisation of the agricultural industry, and printed copies of the scheme had been circulated amongst the members assembled. He suggested that someone might move the general approval of the scheme, as he gathered that they were in favour of it.

Mr. DOUGLAS moved that the remarks of the Premier be endorsed by the meeting, and that his scheme be approved of.

Mr. DEAN seconded the motion.

Mr. J. PURCELL suggested the motion be amended to read—

“That this Conference approves of the scheme of organisation outlined by the Premier, and is of opinion that necessary action be taken to bring the scheme into operation at once.”

Mr. DOUGLAS accepted the amended motion, and in this form it was put to the meeting, and carried unanimously.

APPOINTMENT OF DAIRY REPRESENTATIVES.

The PREMIER suggested that the meeting should appoint the representatives of the dairy industry to the provisional Council of Agriculture. Afterwards the council would become a permanent body. Neither the Minister for Agriculture nor himself could give much personal attention to the details of the organising work, and it was not desirable they should do it. The work should be in the hands of the council quite independent of politicians. The council would have to appoint its own organisers, and pay them a good salary. Those present, as representing one branch of the agricultural industry, could appoint their representatives, and the fruitgrowers and canegrowers could appoint their representatives later on. He suggested that they should appoint their five representatives. The Government would, at a later date, appoint five members to represent the Government on the council. In all probability Mr. Story, Public Service Commissioner, would be one of those representatives. Mr. Story possessed excellent organising ability and had assisted him greatly in

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formulating this scheme. He had given great consideration to agricultural education, perhaps more than any other man in the State, and the council would look to him for advice. He suggested that the five representatives be appointed.

Mr. STAFFORD moved—

“That the five dairy representatives be chosen by the Advisory Board appointed that day.”

Mr. WINNETT seconded the motion.

Mr. WARREN opposed the motion. He had every confidence in the members of the Advisory Board, but he thought the council should be elected by the farmers themselves. He knew it was difficult to get meetings of farmers, and he quite understood that, as the farmers worked hard and had no time to attend meetings. It was hard for a farmer to make a living out of his farm now, and that was the reason his sons migrated to the cities, where the conditions of employment were better than on a farm. That was bad for the country, and was increasing the population of Brisbane at the expense of the country. If they could only get rid of party politics they would have a much better country, and he would like to see the Premier come out as a non-party politician. (Loud laughter and applause.) He would oppose the motion, and moved as an amendment—

“That the members be appointed from the delegates present.”

Mr. PETERSON (Killarney) seconded the amendment.

A Forward Move.

Mr. SLOAN congratulated the Chairman and the Premier on the proposition they had put forward. Dairying and other agricultural pursuits were good for the State and should be fostered. The Premier had taken a forward move in inviting the representatives of the dairy industry to meet to discuss this proposition. The more they could raise the status of the farming industry, educationally and otherwise, the better it would be for their children. They should put party politics on one side and embrace this opportunity. He had gathered from the remarks of the Premier and Chairman that there was a possibility of the party political system being abolished. He hoped to see it abolished and that all would be working for the good of the State. He did not agree with placing in the hands of the six men who had been elected to the Advisory Board the power to elect the grand council. He had been in favour of the election of the Advisory Board, not exactly because he believed in the men on it, but because the dairy industry was in such a critical position that they had to give some opportunity of rendering assistance in the near future. They had, therefore, sunk all differences and elected the Advisory Board. The Premier pointed out the delay which would ensue by referring the matter of the election of the board to their organisations. The various associations might turn round and say that the Conference had no right to elect a central council without reference to the associations, as there was no hurry for it. Let the delegates, therefore, go back and place the matter before their associations to be decided by ballot. If this Advisory Board was going to be truly representative of the dairy industry, they would want loyalty amongst the co-operative factories. They had had a little experience in his district some time ago in illustration of this. They joined a pool and also the co-operative association of Queensland.

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They found that one of the co-operative factories of that association was shipping butter to Townsville and under-selling them. They wrote to the company and also to Mr. Harris, and offered their butter to him at $1\frac{1}{2}$ per cent. less than they were selling it in Townsville, but the offer was refused. It should be understood that they could not turn round and cut each other's throats. None of the farmers wanted to squeeze the consumer. They were out to get a fair value for their products, and to enable the consumer to get a fair wage, so that he could buy butter at a reasonable price. They must fix the price of butter to the consumer in accordance with the cost of production. The practice had been to fix the price to the consumer first, and to leave an inadequate price for the farmer. He had received a wire from his association that he was not to jeopardise or in any way pledge them until they knew the position fully.

Mr. HEMBROW (Roma): One of the previous speakers said that he should go back to his company to explain matters. His own opinion was that the delegates were there representing the shareholders of their companies. He was prepared, on behalf of his company, to take the responsibility of voting on the question before them. It would take a good deal of time for them to go back and consult all the suppliers of each factory and advise them what to do. The suppliers would simply take their advice on the matter if they went back to them, so that it was quite competent for the Conference to elect the members of the council.

Mr. G. GRAHAM said he understood the Premier to say that the six members of the Advisory Board would be subservient to the council.

The PREMIER: He did not use the word subservient: he said in some sense subordinate to the council. He did not mean that they would be under the supervision of the council. The exact nature of their functions and duties would depend upon what the organisation itself evolved. If there was to be a central council of agriculture it was bound to be the supreme authority in the Queensland Producers' Association. Once having set up an Advisory Board to undertake certain functions they must not then interfere with the Advisory Board; but the council would be the superior authority, in the sense that it would control everything, but it would not interfere with members of district councils or of the Advisory Board in the special work allotted to those authorities. Each would have their own functions, but the council would be the highest authority in the association. It was obvious, or it ought to be obvious, that it was impossible to outline a scheme and settle every detail at the commencement. The scheme must grow and the constitution must be evolved as time went on. All they could lay down at the start was the basis on which the scheme could be established. They were now discussing the council of agriculture, which would have important functions, and they could launch the council and organise the district councils and formulate a constitution to work on at the start. While doing that the council would lay down the lines of action which ought to be adopted. When he used the term that the Board was a subordinate body to the council, he thought that in their own sphere they should be the final authority.

Mr. G. GRAHAM: The council will be supreme?

The PREMIER: It will be the executive head.

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Mr. G. GRAHAM: The Council can override the Advisory Board.

The PREMIER: No, not in the matters referred to the Advisory Board for their investigation and decision. The functions of both ought to be defined. The council would be a consultative board on all branches of agriculture, and would consider all problems relating to agriculture. The council would have the right to lay down plans and make recommendations for the agricultural industry as a whole, so in that sense it would be the superior authority; but each Advisory Board would look after its own functions. He was not wedded to any particular form of control. This was a tentative scheme, and he thought it was a workable one, and they could alter it to suit the existing conditions as time went on.

Mr. SLOAN asked if the Advisory Board brought forward any matter which conflicted with the council, which opinion would prevail.

The PREMIER: It was not necessary to attempt to deal with every problem at the start. The council would have to use discretion. Say the fruit-fly trouble was brought forward, the council might decide that that was a matter that could be best dealt with by the Advisory Board for the fruit industry, but they would find out the best way of dealing with these matters as time went on. Other matters might be referred to the Agricultural Department, and matters referred to the Agricultural Department might be sent to the council or the Advisory Board. Common sense would have to be exercised when referring matters to different bodies for investigation and attention. There might be overlapping for a start, but as the scheme evolved they would get over that difficulty.

Mr. SLOAN thought the Advisory Boards would be antagonistic to the council of Agriculture.

The PREMIER: If matters arose which affected more than one branch of the agricultural industry it would be dealt with by the council. The council would have the means for adjusting differences, and in that sense would be the final authority.

Mr. HOLTON pointed out that, according to the Premier's scheme, the council would have the same functions to attend to as the Advisory Board elected that day.

The PREMIER pointed out that those functions were allotted to the Advisory Board that day because the council of agriculture was not yet in existence, nor could the council exercise those functions until the Queensland Producers' Association was firmly established; but as soon as the council became a permanent body they would take over those functions set out in the scheme. The Advisory Board would then deal with particular matters, such as a pool or the co-ordination of co-operative companies. Experience would show them what functions to take from the Advisory Board.

Mr. W. T. HARRIS thought it would mean too much delay to go back to the co-operative companies to elect the five dairy representatives. He thought they should be elected that night.

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Mr. STAFFORD stated that they had already appointed an Advisory Board, and if they appointed five members from the dairymen to act on the council they would be supreme to the Advisory Board. He thought they should appoint five members from the Advisory Board to act as their representatives on the council.

Mr. ANDERSON stated that they appointed the six best men on the Advisory Board, and now they were going to appoint the next best five, who would be supreme over the best six on the Advisory Board.

The PREMIER: It does not matter whether you select the same men or five additional men.

Mr. G. GRAHAM: If the six men appointed to the Advisory Board were elected they would have a jolly sight too much to do, as he understood they would have to do all the organising. There was a chap called "Pooh Bah," and those six men would be in the same position if elected to the council.

The PREMIER: It might be advisable to lay it down that until they had the organisation established, or at any rate formed in such a manner that it would have some effective force, they should not exercise any jurisdiction over the present Advisory Board. The council they were electing was only the council to prepare for the organisation, and not to exercise all those functions that were in the objective. Therefore it might be necessary, in order to prevent any misunderstanding of their powers, that it be provided that they do not exercise any jurisdiction over the Advisory Board until the lapse of a certain time.

Mr. W. T. HARRIS: The Advisory Board which had been elected had special functions in looking after the resolutions passed at the Conference, whereas the central council would have different functions altogether. One of the functions of the council would be to organise the farmers, and the power would be conferred upon them to see that the State was divided into certain divisions wherein district councils and associations could be formed. It was therefore necessary to elect another five men to do that organising.

Mr. SLOAN: He was not objecting to five men being appointed, but he was in favour of Queensland being divided into different divisions, and the agriculturists in those divisions given the opportunity of selecting the best men in the division. If those five men were appointed by the Conference, they would probably comprise men from districts from Maryborough down: and, as the Chairman was well aware, the Atherton District would soon overshadow any other dairying district in Queensland, and the dairymen in North Queensland should therefore have an opportunity of selecting a member of the council.

Mr. PRITCHARD: It would save a good deal of overlapping if they specified that the Advisory Board should work for twelve months until the farmers were properly organised. The council of agriculture could then take the place of the Advisory Board.

Mr. AUSTIN: The Conference had elected an Advisory Board specially to look after the dairying industry, and they were going to be very busy during

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the next twelve months. If they carried out thoroughly the responsibilities they had undertaken, they would have their work cut out. They wanted an efficient body of men on the central council—men of organising ability—and they should get the very best men available. The scheme was ripe, and his advice was to let it go on and do not endanger it by an error of tactics.

Mr. GEORGE BURTON (Wyreema): As it was impossible for the Conference to elect members to the council from other industries, would it not be fairer to defer the matter till later on?

The PREMIER: They had there the most representative body for such an election that could be got together.

Mr. HOPPER: He took it that they had elected an Advisory Board to look after the butter and cheese industries. That was the special business they had to centralise on. In addition to that, it was necessary to organise the farming industry generally, and it was quite possible that men capable of looking after the business end of the stick were not capable of looking after the industrial end. The farmers themselves were their worst enemies, and to protect them they must protect them against themselves. They must organise from one end of Queensland to the other. The Advisory Board would be in a more central position, where they could get a better inside knowledge into the marketing problem.

Mr. McDONALD (Central Queensland Dairymen's Company): The position might be cleared up somewhat if they could come to an understanding as to the life of the central council. He took it that it was not the intention of the Premier to bring the central council into being that evening by the mere appointment of five representatives from the dairying industry.

The PREMIER: It would take a month at least to constitute it fully.

Mr. McDONALD: The appointment of an Advisory Board was necessary because of the parlous state of the dairying industry, and it would be most unfortunate if any action by that board had to stand over pending the appointment of a central council.

The PREMIER: That was not involved. The Advisory Board could go straight on with their work. They would not have to wait on the constitution of the central council.

Mr. McDONALD: He would give the Premier and the Minister for Agriculture all the encouragement possible in regard to bringing about the proposed scheme; at the same time it would be disastrous should it happen that the functions of the Advisory Board should be curtailed in any way. If they could appoint a time during which the Advisory Board could act independently of the central council, it would overcome a great deal of the difficulty with which they were faced.

Mr. HOLTON: He would like to take that opportunity of complimenting the Premier and the Secretary for Agriculture on bringing the dairymen together. There had been various meetings of dairymen, but no such representative meeting as the Conference, and he must compliment the Premier on the appointment

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of an Advisory Board. Certainly, it was a foregone conclusion, and they could not have appointed better men. The mover of this motion might have been quite right. They had appointed good men, who knew the dairy business from A to Z, and who could easily have selected the five men for the council.

Mr. PURCELL: He would like to ask the Premier whether the central council would have to personally organise the industry. If so, it was necessary to have members of the Advisory Board on the council.

The PREMIER: He was glad the question was asked, as it gave him the opportunity to point out that the council of agriculture would not have to do the organising work personally. It could not be expected, because the council of agriculture consisted of fifteen representatives of the agricultural industry and the five Government representatives. The council would really constitute an executive, and in that capacity they would direct the course of organisation. Under the heading of "District Councils," it was stated—

"In every district determined upon by the council of agriculture there shall be established a district council. This council shall be constituted by representatives of each of the local producers' associations. The district organisers appointed by the council of agriculture shall be members of the district council for the district in which they are acting."

It implied that the council of agriculture would have a director appointed with the view of getting the thing launched without any delay. They would recollect that he had wired to Mr. Gullett, whose organising capacity was well known, and they would have appointed that gentleman to the position of director if he would have accepted the position. If the scheme he had outlined to the Conference was acceptable to them, it was his intention to leave the appointment of a suitable person to the position of organising director to the council of agriculture. If they could get a man like Mr. Gullett to carry on organisation under their direction, they could appoint him. Let them appoint the district organisers from amongst the farmers themselves, and the work would go on. He did not want the members of the council to go out organising. No doubt they would do a certain amount of propaganda in the district from which they came. They could place the work of organisation in the hands of district officers. He could mention half a dozen men in the room who with himself could organise the work in three months, and the council might do the same thing. He wanted to launch the movement so that the machinery could be established, and the organisation would follow. He was satisfied that the farmers in the various districts would respond. Scores of letters had come into his department and the Department of Agriculture welcoming the proposal for an organisation. The council would organise the staff they employed, and get the most capable man as director for the purpose of keeping the thing going.

The CHAIRMAN put Mr. Warren's amendment—that five members should be elected by the meeting to represent the dairying industry on the council of agriculture—which was carried.

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Mr. MORWOOD moved: "That three men representing the butter industry, and two representing the cheese industry, be elected by the Conference as representatives on the council of agriculture." These men, he thought, would be the men best qualified to sit on the council.

Mr. PRITCHARD seconded the amendment.

Mr. SLOAN: He took it that the six men who were elected to the Advisory Board would receive a salary for their services.

The CHAIRMAN: The Government will pay them.

The PREMIER: The members of the Advisory Board must receive a fee for the time lost while serving on the board. They must receive their travelling allowance and a certain allowance for the time lost. It would be different under the permanent organisation. He did not know whether the permanent organisation, when it was formed, would allow any fees either to the members of the district council or of the council of agriculture. In the first three months members would be called together to consider organising and direct matters, and they should be compensated for their loss of time, and no doubt the Government would provide for that; but the question as to what the permanent policy of the Government would be with regard to the members of the council of agriculture was a matter for future consideration.

Mr. WARREN: For the first twelve months the function of the council of agriculture would be to organise. Some of the best organisers were not on the Advisory Board. He had in his mind two men who had had vast experience in organising, and if the motion was carried those men would be cut out.

The CHAIRMAN: The amendment is a negative of the motion, and it is out of order.

Mr. O'SHEA (Strathpine) asked if the members of the Advisory Board were eligible to sit on the council of agriculture as representatives of the dairying interests?

Mr. DOUGLAS thought they were asking the members of the Advisory Board to do too much. It would be better to let them do their work on the Advisory Board and not appoint them to the council at all. It would be no detriment to those men to appoint five others to the council.

Mr. SLOAN said the representatives on the council would have different functions to the Advisory Board. They would appoint the organisers in the different districts according to the geographical positions.

Mr. McANALLY moved a further amendment—

"That the gentlemen who have been appointed as members of the Advisory Board are ineligible to sit on the council of agriculture."

Mr. HOPPER seconded the amendment.

The amendment was put to the meeting and carried by 35 votes to 19.

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The CHAIRMAN called for nominations to fill the five positions as dairy representatives on the council, and the following were nominated:—Messrs McAnnally (Dalby), Douglas (Cooroy), Pentecost (Brisbane), J. Purcell (Toowoomba), Sloan (Atherton), Winnett (Kingston), Fitzgerald (Cambooya), Power (Burnett), and Todd (Warwick).

On resuming it was decided to elect the five members by ballot, and the election was then held.

The CHAIRMAN announced the result of the ballot as follows:—

Mr. H. McAnnally (Dalby)	32 votes
Mr. A. S. Douglas (Cooroy)	38 votes
Mr. J. Purcell (Toowoomba)	55 votes
Mr. W. J. Sloan (Atherton)	44 votes
Mr. J. T. Tod (Warwick)	44 votes

That was an absolute majority, and he declared those five gentlemen duly elected by the Conference.

Mr. DOUGLAS asked the Premier whether he thought it wise to proceed with the various organisations that were now being formed in the country and then bring them under the bureau system later on.

The PREMIER: The best course to be adopted in regard to that matter would be to arrange for the conversion of those organisations that were now existing or about to be established into the local producers' associations that would be established under the scheme. When he met the fruitgrowers at Stanthorpe, the council of fruitgrowers there practically made the suggestion that their organisation was willing to come *en bloc* into the new organisation. It would mean, of course, that that organisation of fruitgrowers would have to adopt for their rules the rules provided by the council of agriculture for the local producers' associations. They would dissolve the old association and form themselves into a new association. The same thing could be done with the Farmers' Alliance, dairymen's associations, and various other associations of that kind, but there might be some organisations amongst the farmers which took part in political affairs, and he did not desire to dissolve their existing organisations. There would be no necessity in such case for them to dissolve, but it would assist the scheme if the existing organisations throughout the State would agree to merge into the large organisation. Facilities for that would be provided by the council of agriculture.

Mr. DOUGLAS: Would it be wise to suggest that those organisations join up with the different sections of the farming industry—the dairymen with the dairymen's associations, and the fruitgrowers with the fruitgrowers' associations, and so on?

The PREMIER: That was how it would be arranged. There were five great branches of the agricultural industry—fruit growing, wheat growing, dairying, sugar, and general farming. In each of those five branches there would be the sectional organisations, and those associations that were now organised in any one branch could easily be merged in the particular sectional organisation under the scheme.

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Mr. JOHNSTON (provisional director of the new co-operative company being formed at Rockhampton) moved: "That Conference of dairymen place on record the appreciation shown by the Premier and Secretary for Agriculture towards the dairymen and farmers of Queensland."

Mr. McINTYRE (Mount Tyson): He was very pleased to be there to express similar opinions with regard to the Premier and the Secretary for Agriculture, and to express his thanks to them for the assistance they had given to the wheatgrowers in particular. The wheat pool instituted by the Government had been of great assistance to the wheatgrowers. If the Premier could better the conditions of the man on the land by the action he had taken, he deserved the thanks, not only of the farming community, but of the whole of Queensland and of the whole of Australia. (Hear, hear!) The Premier in his address stated that the farming industry was stationary—that it was not progressing. It was not progressing, and as far as his part of the country was concerned it was retrogressing. If the Premier, by the action he was taking, could stop that retrogression it would be a great achievement, and he would deserve the thanks of the men on the land.

The vote of thanks was carried by acclamation.

The CHAIRMAN: The Premier and himself appreciated the hearty vote of thanks which had been tendered to them, but the Government were equally grateful to the farmers present for attending the Conference. He considered that the Conference had been very successful. There was a lot of work in front of the members of the Advisory Board, who would find that they had assumed great responsibilities, but with that responsibility there was power to do things.

The CHAIRMAN then declared the Conference closed.

THE DAIRYING INDUSTRY ADVISORY BOARD.

Pursuant to the decisions of the Dairy Conference, the Advisory Board for the Dairying Industry has been constituted as follows:—

Chairman: Mr. E. Graham, Chief Dairy Expert (Government Representative).

MEMBERS.

Butter Section: Messrs. W. T. Harris, T. Flood Plunkett, and W. E. Dean.

Cheese Section: Messrs. William Purcell and Henry Keefer.

Condensed Milk Section: Mr. G. Burton.

Secretary: Mr. W. H. Franklin, Department of Agriculture and Stock.

Two sittings have taken place, at which consideration was given to the following matters and recommendations made to the Minister accordingly:—

The better service and design of trucks conveying butter, cream, and cheese to and from the factories.

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The necessity for adequate provision being made for the cold storage of dairy produce at this port.

A reduction of rail freights covering dairy products in their manufactured state in transit to market.

Consideration was given to the obtaining of information concerning the market conditions of dairy produce in all available markets.

The matter of herd testing was fully discussed in all its phases, and a recommendation was made to the Minister for Agriculture requesting that consideration be given to increasing the number of stud dairy stock at the Queensland Agricultural College, with the view of assisting to provide the stud bulls necessary to supplant the inferior animals now employed in many dairy herds.

Information is being obtained as to the complement of stud bulls now available.

The Board unanimously endorsed the necessity of bringing into greater prominence the conservation of fodder, especially in the form of ensilage on dairy farms, and intend to urge dairy farmers to give attention to the construction of silos under a co-operative scheme as soon as the organisation will permit of such action being taken.

The improvement in the quality of dairy produce was considered by the Board, and the fullest information is being obtained concerning the results of pasteurisation of both milk and cream in other dairying countries; and the Board expect at a later date to be able to furnish definite particulars in regard to the improvement in quality that may be effected by pasteurisation, also cost of plants, installation, &c.

The Board will sit again on Thursday, 6th April, in the room allotted for its use, at the Office of the Department of Agriculture and Stock, Brisbane.

HYDRO-ELECTRIC POWER.

The Minister for Agriculture (Hon. W. N. Gillies, M.L.A.), in the course of a statement to the Press, on his return from Tasmania, referred to a big Government water power scheme now approaching completion in the Island State. *Inter alia*, Mr. Gillies said:—

“What impressed me most, and which more than anything attracted me to Tasmania, was the Tasmanian Government hydro-electric power scheme, involving a probable expenditure of £2,750,000, which was started nearly six years ago. The scheme is not yet complete, but the power at present being generated is equal to 18,000 kilowatts or 20,000 horse-power, and is being supplied to various power users, including the Hobart Municipality for its tramways. It is also being supplied to the electrolytic zinc works at Risdon at about 50s. per horse-power per annum. The carbide works at Electrona use 3,500 horse-power, and will eventually use 7,500. Cadbury, Fry, and Co.'s works at Claremont are also supplied. In my opinion, cheap motive power being of such importance, nothing has been attempted that will be of greater benefit to Tasmania.”

We have no great natural lakes in Queensland, but we have numerous great waterfalls, with power and water running to waste. We also have rivers that can be cheaply dammed, and thus create artificial lakes for power and also irrigation.

Organisation of the Agricultural Industry. A State-wide Co-operative Scheme.

ENRICHMENT OF RURAL LIFE.

A Summary of an Address by the Premier, the Hon. E. G. Theodore, M.L.A., to the farmers of the Laidley District, focusing the effects modern social and economic changes are having upon the primary industries, outlining a scheme for the State-wide and effective organisation of the Agricultural Industry, and explaining generally a far-reaching and constructive rural policy.

PREMIERS' ADDRESS TO LAIDLEY FARMERS.

On 21st February, before a large and representative gathering of farmers of the Laidley district, the Premier (the Hon. E. G. Theodore, M.L.A.) discussed the difficulties confronting primary producers, suggested solutions of present problems, and sketched a broad and practical scheme for the general betterment of the agricultural industry and the enrichment of rural life.

The main points of the Premier's address are summarised as follows:—

The Importance of Agriculture—

The Government has never underrated the importance of agriculture. It has always recognised that the future of the State is intimately associated with the soil, and agriculture is the basis of all our future hopes. No one has a greater claim to be regarded as a worker than the man who tills the soil; and no one is more entitled to participate in shaping the policy and governing the affairs of this State than the members of that great and influential class. The farmer is the mainstay of our civilisation and the most indispensable worker in the community. The Government recognises the importance of the cultivators of the soil and the acuteness of their problems. The main features of its policy are those dealing with the encouragement of agriculture and the protection of the man on the land. Much of the time and energy of the Government, since 1915, have been devoted to translating that platform into effect, as is evidenced by the following list of legislative and administrative achievements:—

1. **Cane Prices Regulation**, which for the first time in Queensland ensured to the cane-growers a fair price for their product. It can reasonably be claimed that this scheme has benefited the cane-farmers to the extent of not less than one million pounds sterling since 1915.

2. The Sugar Acquisition Agreements.—These agreements have stabilised the price of sugar, and made the sugar industry the most prosperous business in the State. In 1915 the value of the sugar products of this State was computed at £1,500,000; in 1921 it had increased to over £9,000,000.

3. The Repeal of the Railway Guarantee.—This measure relieved the farmer of the railway land tax.

4. The Queensland Wheat Pool, which enables the wheat crops to be marketed under better conditions than ever obtained in the past.

5. Advances to Settlers.—The entire system of State advances to new selectors has been liberalised and brought up to date.

6. Co-operative Agricultural Production.—The Government instituted the system of advances for the purchase of dairy cattle. Advances under this Act have been made to 552 farmers.

7. Cold Stores for Farmers' Produce.—The Government is erecting a modern cold store with a capacity of 600,000 cubic feet of cold storage space for butter, cheese, fruit, vegetables, and eggs.

8. Main Roads Scheme.—The Government has launched a comprehensive policy for the improvement of the main roads of the State. Particular attention is being given to the roads in agricultural districts.

9. Cotton Cultivation.—A guaranteed fair price is being granted to the producers of cotton by the Government, with the result that this industry is rapidly expanding.

10. Relief to Settlers on Repurchased Estates.

11. Amendment of Income Tax Act.—This enables the farmer to carry forward the losses of previous years when calculating his income for taxation purposes. Queensland is the first State to carry this reform.

12. Drought Time Assistance to Farmers.—The Government dealt generously at all times during the droughts of 1915 and 1919 when they were appealed to by the farmers. Seed wheat and fodder for starving stock were distributed on the most generous terms. As much as 87,000 bushels of seed wheat were distributed among 1,400 farmers in one year. Aid in many other ways was given to farmers during the drought period.

In addition to the foregoing, the Government has responded to every reasonable request made by farmers for protection and encouragement. The following measures have been passed solely in the interests of the agricultural industry:—

Cheese Pool Act.

Banana Industry Preservation Act.

Fertiliser Act.

Stock Foods Act.

Diseases in Stock Act.

Brands Act.

Supervision of Produce Agents.

Research for Eradication of Pests.

Marketing of Farmers' Wool.

Fruit-growing Instruction.

Free Soil Analyses for Farmers.

Cheap Arsenic for the Destruction of Prickly-pear.

Pure Seeds Act.

The Producer and Consumer—Identity of Interest—

In recent times there has been a distinct move towards the amalgamation of the forces of the farming community and city consumers for the purpose of giving effect to a mutually beneficial programme of legislation and reform. This movement has gained great headway in the United States of America and in Canada. An identity of interest is recognised by both these inter-dependent sections; and this is expressed by a platform mutually agreed upon, and which is by force of combination being gradually forced into effect.

A comprehensive and constructive policy for the future development and encouragement of agriculture is the greatest need in this State at the present time.

A prosperous and expanding agricultural industry and a contented rural population should be our most serious aim.

In Queensland we have passed the gold era, and have not yet begun a manufacturing era; but we are on the threshold of a great agricultural era.

We have been endowed by Providence with a wonderful heritage—a land which is richer in natural resources, climate, and fertility than any other undeveloped country on earth.

It is to agriculture, and to the industries dependent on agriculture, that we must turn our attention in formulating future policies.

A large measure of our future energy and constructive ability must be devoted to the solution of agricultural problems.

A Tangible and Realisable Objective—

The Premier laid down the following as a tangible and realisable objective:—

1. Agriculture as an industry must be made a remunerative industry to those engaged in it.
2. The industry must be greatly extended, for only in that way can an additional population be absorbed; and it is only by increasing the population that we can reduce our per capita financial burdens.
3. The conditions of life of all country dwellers must be made more attractive than at the present time.

An agricultural policy, to be effective, must include proposals dealing with all of the following topics; these would constitute some of the leading planks of an agricultural programme:—

1. Co-operation.
2. Pools.
3. Advisory Boards for the different sections of the agricultural industry.
4. Agricultural education.
5. Main roads.
6. Extension of social amenities to rural life.
7. Opening land for settlement.
8. Representation abroad to promote trade for primary products.

Under the present limited extent of co-operation among those engaged in the primary industries, the farmers are the greatest sufferers from market fluctuations.

When depression occurs in the market price of products, the farmer has to bear almost the entire burden of the fall.

The middlemen gain most of the advantages by refusing to lower prices to the consumers.

When there is a rise in prices, the middlemen enjoy the benefits, for the simple reason that the increases in prices are not passed on to the producers.

Neither the producers nor the consumers gain any advantage from market fluctuations.

Effective Co-operation the Need.

The farmer by establishing effective co-operation can remove many of the difficulties that exist in connection with the marketing of his produce, and can eliminate a great deal of the middlemen's profits.

Co-operation is the best form of self-help for the man on the land.

In the United States of America the co-operative principle has been extensively developed in the farming community, with the result that farmers in that country are more prosperous than farmers in any other country of the world.

What has been done in the United States can be done in Queensland.

If farmers made use of the co-operative principle, they could solve all the problems relating to production, transportation, distribution, finance, and marketing of their products.

The Queensland Wheat Pool—

The Queensland Wheat Pool is a living example of what can be done by the farmers by co-operative effort.

The Queensland Wheat Pool is based upon pure co-operation.

The farmers constitute the Board of Management, formulate the policy, and direct the whole business of marketing the wheat crop, which previously was done solely by traders and commission agents.

The farmers had never managed this business before; but with little preparation they secured the necessary parliamentary authority, established the pool, appointed a staff, devised the machinery of administration, arranged the finances, and in the first year handled the whole crop of 4,000,000 bushels, which was a record crop for Queensland.

Speculating in wheat was prevented, middlemen's profits were eliminated, the business was managed for one-third the ordinary cost of marketing, and the farmers were paid the full value for their wheat.

What has been done by the farmers in connection with wheat can be done with all other staple products.

The Full Tide of Agricultural Co-operation—

It is not contended that co-operative action in the handling of other products can be done as easily as it was done with regard to wheat. The full tide of agricultural co-operation will not be realised until a great deal of

preliminary organisation has been undertaken in the farming communities. This is necessary in order to educate the community up to the principles of the scheme and to prepare the way for the efficient management of a complex business. In America similar preliminary work has been undertaken by what are known as Farm Bureaux, which have been established in every farming locality.

The objects of this organisation are to encourage and promote co-operation among farmers in every effort to improve facilities for the economic and efficient production, conservation, marketing, and distribution of farm products. They also study the questions of constructive rural legislation and assist in the determination of agricultural policies. Procedure on similar lines is applicable to Queensland.

Some kind of basic organisation must be established among the farmers by the farmers themselves.

Through the agency of such an organisation the farmers will be assisted to solve the problems of production and marketing and become the driving force toward co-operative effort. These organisations would become the medium for the spread of knowledge and education, and would enable farmers to become articulate as a class, and a real force in the land.

District Agricultural Councils—

As an organisation corresponding with the American Farm Bureaux, the Premier advocated the establishment in all farming localities of District Councils of Agriculture; these to be linked up with a Central Council having jurisdiction over the whole State. These Councils should be elected by the farmers by direct vote, and should work in close co-operation with the Department of Agriculture.

The objects of the organisation should be to co-operate with the Department of Agriculture—

1. In the development of rural industries.
2. Investigating and dealing with agricultural problems.
3. In advising agriculturists with regard to matters which require scientific knowledge and training.
4. In securing effective action for the controlling of diseases and pests generally.
5. In securing improved markets for the disposal of farm produce.
6. In formulating a general policy of standardising.
7. To advise in regard to agricultural education and rural schools.
8. To recommend, when necessary, the formation of advisory boards or pools to deal with wheat, butter, cheese, fruit, or other sections of the industry.

If the scheme is favourably received by the farmers, they will unite themselves to take up the idea. The Government will give them every encouragement and assistance. In the United States, officials known as rural agents are appointed. These are men with practical and technical knowledge of agriculture, and of all problems relating to agriculture, who keep in close touch with the Farm Bureaux, and are of immense service in the farming

communities. It will be seen that, if the farmers are organised in the way suggested, the establishment of large co-operative schemes will be easy of attainment. Sporadic attempts at co-operation are useless. The cost of management in small co-operative enterprises is too high, and the management often inefficient. That is the reason why co-operation on a small scale often fails.

State-Wide Co-operation to Stabilise Markets.

If the farmers are willing to establish co-operation on a large scale, the Government will confer the necessary authority upon the co-operative associations, and, moreover, will back them financially. By State-wide co-operation embracing all sections of primary production, the industries will be emancipated from market manipulators. The movement will bring about stabilised prices for primary products. It will give farmers access to larger markets, and it will secure a better equilibrium of supply and demand. It will tend to reduce farm costs and costs of transportation, and will save the farmers from the evil effects of market gluts.

There is absolutely no reason why, under a properly managed system of co-operation, the whole of the products of the farming community should not be handled, marketed, and financed by the farmers themselves. The operations, necessarily, will be on a large scale; but the magnitude of the operations is no barrier to the success of the scheme.

The Wheat Pool Transactions—

The Wheat Pool transactions last year involved one million five hundred thousand pounds sterling. The Wheat Pool dealt with only one commodity. All primary produce—wheat, dairying, fruit, and, if necessary, wool produce from grazing farmers—could be handled under the scheme outlined by the producers without intermediate aid. The pool idea is merely the application of the commercial combine to the producing industry, but with this notable distinction:—That, where it is managed by farmers' co-operative societies, the profits and the whole advantage gained from efficient management and reduced costs are retained by the producers.

These proposals for the better organisation of the farmers by means of Agricultural Councils are advanced on the ground that such preliminary organisation is necessary to prepare the way for the real business of co-operative dealing on a large scale. The agricultural industry is bound to grow to very large dimensions in Queensland; and amongst the farmers there are men of brains, knowledge, and experience whose advice should be sought in connection with the formulation of an effective agricultural policy.

The Problem of Undeveloped Lands—

No rural policy would be complete which did not provide for the extension of agricultural settlement. This can be accomplished in Queensland by providing closer settlement on the areas now occupied, and by opening new Crown land for occupation. Both these modes will be adopted by the Government and proceeded with as rapidly as possible.

Considerable areas of good land owned by private individuals, but not put to any productive use, may be seen in various parts of the State adjacent to existing railway lines. The non-development of this land is seriously retarding the progress of the State. Large areas of idle land in the vicinity of existing settlements hamper the operations of the selectors. Such lands are

breeding grounds for pests, besides being responsible for sparse and scattered settlement. The Lands Department experts have been asked to study the question and report upon the best means of dealing with it.

Irrigation—

Surveys and investigations carried on by the Water Supply Department during the last two or three years have revealed the existence of several extensive, yet compact, areas eminently suited to the purpose of irrigation settlements. The Dawson River scheme embraces nearly a quarter of a million acres of irrigable lands of high quality, and a proposal for a reservoir which will have a capacity of over 1,000,000 acre feet of water. It is expected that this scheme will eventually accommodate upwards of 10,000 irrigation farmers.

Another scheme which has been very favourably reported on is that of the Lower Condamine, in the vicinity of St. George. A succession of weirs in the river between Warra and St. George will impound 150,000 acre feet of water, which will be sufficient to irrigate 50,000 acres of land. The soil and climate are both ideal for raisins and other dried fruits, or lucerne and like crops. As a fruit and dairying centre its future, if water is made available, is most promising. At least 1,000 families could be settled in this area. There were other highly-promising schemes beside those he had mentioned. The Mount Edwards proposal and the one on the Severn River are likely to be developed into valuable irrigation settlements at no distant date.

These schemes will be the means of increasing our rural population and the wealth production of our State to an enormous extent. But to carry them out the Government expects and requires the solid support of all our people who have the interests of agriculture at heart. There is a large and influential section in the cities always ready to hamper the Government in proposals of this kind, and throw cold water on development schemes that involve the expenditure of large sums of money in country districts. It is to combat these Queen-street interests that the Government appeals for the co-operation of the country residents.

An Improved System of Agricultural Education.

A consideration of the work being done by the present Agricultural College shows that the College is not satisfactorily fulfilling the purpose for which it was established. The Government has endeavoured to discover the causes which have militated against the success of this institution, and, at the same time, to devise plans for an extended and improved system of agricultural education.

In formulating a policy on this subject the Government may decide to discontinue the Agricultural College as it is constituted at present. An endeavour will be made to co-ordinate agricultural tuition with the general system of State education, providing thereby a scheme of agricultural secondary schools for all pupils leaving the primary schools who decide to take an agricultural course. The secondary course will lead up to the University for those who desire to avail themselves of the benefits of that institution.

Conditions of Rural Life—

It is undeniable that under existing conditions agricultural life is unattractive. There is an exodus of farmers' sons towards the cities. The towns grow large while the rural population remains stationary. This is an

evil which is grievously afflicting a great many countries at the present time. It is a problem which in Queensland we must solve at all cost: our future prospects are vitally connected with land settlement and an increase of rural population. It is our bounden duty, therefore, to encourage people to remain on the land, as well as to induce others to leave the towns and take up an agricultural career. To accomplish this, the life must be made endurable. The Government is willing to assist the farmers' organisations in any practicable schemes for the improvement of the social necessities of the rural communities. The Councils of Agriculture, if they are established, will doubtless give attention to this vital problem.

Idealistic and Visionary Policies Useless—

The Premier invited the producers of the State to give earnest consideration to the policy he had outlined. It was by no means a policy spun out of political moonshine, but an earnest attempt to put forward a constructive policy for the development of the principal industry of this State, and the emancipation of the struggling farmer from the evils that at present beset him. Nor was it a policy shadowy and unattainable. It was the essence of practicability. He did not believe that all that was required was to "tickle the earth with a hoe and she will smile a harvest." The farmers were faced with the stern realities of existence, and idealistic and visionary policies were useless. The policy outlined was one that can be carried into effect if the farmers lend their support. It will take millions of pounds sterling to establish co-operation on the extensive scale advocated and to finance the projected development schemes; but the money is available, because this country has the resources. The capitalised energy and the resources of the man on the land ought to be good enough for a vast amount of credit to finance co-operative enterprise, even of gigantic dimensions. Cities and towns in this State are able to raise scores of millions in the aggregate for local enterprises, water supplies, tramway schemes, street lighting, and sewerage. What would the assets of the towns be worth if the agricultural industry ceased to exist? If city dwellers, who are dependent upon the prosperity of the primary industries, can raise millions of money for their schemes, surely the agricultural industry, whose resources are manifold, can capitalise these resources, if the credit to be raised is to be used to further enhance the wealth and productiveness of the State!

COUNCIL OF AGRICULTURE.

The representatives of the dairying industry on the Council of Agriculture, selected by the Dairy Conference, are:

- Mr. H. McAnally (Dalby);
- Mr. J. Purcell (Toowoomba);
- Mr. W. J. Sloan (Atherton);
- Mr. J. T. Tod (Warwick);
- Mr. A. S. Douglas (Cooroy).

The selection of representatives of other branches of agriculture—sugar, wheat, fruit, and general farming—is now proceeding.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, FEBRUARY, 1922.

The number of eggs laid during the month showed a decided decrease. Rain fell on 16 days out of the 28, consequently assisting the drop in production at this period of the test, when checks caused by broodiness and changeable climatic conditions have a tendency to encourage moulting. Mr. Fanning had the misfortune to lose his A. White Leghorn, the cause of death being a tumour on the left lung. The birds generally look bright, and are feeding very well. The following are the individual records:—

Competitors.	Breed.	Feb.	Total.
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LIGHT BREEDS.

*J. M. Manson	White Leghorns ...	111	1,448
*W. and G. W. Hindes ...	Do. ...	116	1,433
*T. Fanning	Do. ...	109	1,395
*Mrs. R. Hodge	Do. ...	106	1,391
*H. Fraser	Do. ...	100	1,350
R. Gill	Do. ...	73	1,314
Oakleigh Poultry Farm ..	Do. ...	98	1,271
*C. M. Pickering	Do. ...	82	1,264
*G. Trapp	Do. ...	63	1,259
F. Birchall	Do. ...	74	1,245
*W. Becker	Do. ...	82	1,225
*Thos. Taylor	Do. ...	91	1,209
*C. Goos	Do. ...	93	1,204
R. C. Cole	Do. ...	85	1,204
W. A. Wilson	Do. ...	95	1,201
*R. C. J. Turner	Do. ...	70	1,200
Mrs. E. White	Do. ...	101	1,198
*Thos. Eyre	Do. ...	70	1,195
H. C. Thomas	Do. ...	74	1,191
*S. L. Grenier	Do. ...	104	1,190
*H. C. Towers	Do. ...	63	1,190
*Mrs. L. Anderson	Do. ...	97	1,173
*E. Chester	Do. ...	86	1,167
*E. A. Smith	Do. ...	86	1,161
Bathurst Poultry Farm ...	Do. ...	85	1,161
*G. Williams	Do. ...	90	1,160
*J. W. Newton	Do. ...	57	1,153
J. W. Short	Do. ...	69	1,141
M. F. Newberry	Do. ...	76	1,136
*H. P. Clarke	Do. ...	89	1,122
Henry Stacey	Do. ...	75	1,121
*Haden Poultry Farm ...	Do. ...	89	1,120
*B. Chester	Do. ...	74	1,119
W. Barron	Do. ...	67	1,111
O. C. Goos	Do. ...	55	1,061
Linquenda Poultry Farm ...	Do. ...	95	1,049
Mrs. E. Z. Cutcliffe	Do. ...	63	1,031
E. Stephenson	Do. ...	63	1,016
W. N. Glover	Do. ...	64	974
Brampton Poultry Farm ...	Do. ...	75	973
*W. and G. W. Hindes ...	Brown Leghorns ...	78	972

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Feb.	Total.
HEAVY BREEDS.			
T. Fanning	Black Orpingtons	103	1,396
*R. Burns	Do.	93	1,362
W. Becker	Langshans	117	1,352
*T. Hindley	Black Orpingtons	89	1,328
*A. E. Walters	Do.	75	1,312
*Parisian Poultry Yards	Do.	79	1,294
*C. C. Dennis	Do.	92	1,275
*J. Ferguson	Chinese Langshans	82	1,246
Jas. Ryan	Rhode Island Reds	94	1,227
*E. Morris	Black Orpingtons	87	1,226
G. Muir	Do.	74	1,215
Rev. A. McAllister	Do.	69	1,207
*E. F. Dennis	Do.	67	1,178
*J. Cornwell	Do.	91	1,170
*N. A. Singer	Do.	84	1,161
Jas. Every	Langshans	60	1,141
Jas. Potter	Black Orpingtons	71	1,126
*J. E. Smith	Do.	85	1,117
*E. Oakes	Do.	103	1,098
*R. Holmes	Do.	60	1,094
*H. M. Chaille	Do.	88	1,084
*Mrs. G. Kettle	Do.	100	1,081
G. Cumming	Do.	87	1,075
*A. Shanks	Do.	79	1,074
*E. Stephenson	Do.	72	1,073
J. W. Newton	Do.	64	1,013
F. Harrington	Rhode Island Reds	82	982
T. C. Hart	Black Orpingtons	87	933
Total		5,747	81,338

* Indicates that the pen is engaged in single test.

DETAILS OF SINGLE TEST PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	234	243	270	234	272	195	1,448
W. and G. W. Hindes (W.L.)	251	225	239	255	241	222	1,433
T. Fanning	247	226	255	220	221	226	1,395
Mrs. R. Hodge	230	233	257	238	241	192	1,391
H. Fraser	268	195	241	234	221	191	1,350
C. M. Pickering	235	219	223	190	210	187	1,264
Geo. Trapp	225	190	231	203	216	194	1,259
W. Becker	229	228	193	194	211	170	1,225
Thos. Taylor	208	200	201	173	182	245	1,209
C. Goos	212	223	178	151	174	266	1,204
R. C. J. Turner	204	193	200	197	191	215	1,200
Thos. Eyre	219	193	161	194	225	203	1,195
S. L. Grenier	194	227	172	205	201	191	1,190
H. C. Towers	205	183	208	165	186	243	1,190
Mrs. L. Anderson	207	211	181	192	206	176	1,173
E. Chester	223	187	180	187	188	202	1,167
E. A. Smith	237	165	214	200	191	154	1,161
G. Williams	258	207	166	165	193	171	1,160
J. W. Newton	206	220	230	190	128	179	1,153
H. P. Clarke	234	151	197	158	205	177	1,122
Haden Poultry Farm	128	191	213	204	189	195	1,120
B. Chester	157	172	213	194	204	179	1,119
W. and G. W. Hindes (B.L.)	152	174	149	117	150	230	972

DETAILS OF SINGLE TEST PENS—*continued*.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	176	201	281	203	237	264	1,362
T. Hindley	234	230	246	179	206	233	1,328
A. E. Walters	262	224	219	202	200	205	1,312
Parisian Poultry Yards	222	218	207	289	156	202	1,294
C. C. Dennis	206	189	198	238	226	218	1,275
J. Ferguson	208	202	203	234	209	190	1,246
E. Morris	220	211	154	227	209	199	1,226
E. F. Dennis	193	206	195	177	194	213	1,178
J. Cornwell	162	208	191	214	181	214	1,170
N. A. Singer	210	190	179	198	172	212	1,161
J. E. Smith	242	262	170	129	160	154	1,117
E. Oakes	182	185	182	212	164	173	1,098
R. Holmes	155	200	193	188	203	155	1,094
H. M. Chaille	143	198	194	219	176	154	1,084
Mrs. G. Kettle	182	207	232	111	169	180	1,081
A. Shanks	151	181	176	193	166	207	1,074
E. Stephenson	214	175	195	197	136	156	1,073

CUTHBERT POTTS,
Principal.

SUGAR : FIELD REPORTS.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date 6th March, 1922, as follows:—

“*Babinda*.—At the end of January crops had improved very much since my last visit, early in December. At that time the area known as Bucklands looked backward, but at the end of January the cane there had improved very much. Some fine crops of plant Badila were seen on the farms of Messrs D. O. James, Wilson, Irven, and Harrison, and also upon a few other farms adjacent to Mirriwinni.

“Around Mooliba, and on Cameron’s Branch, some very good cane was noticed, the cane generally having a good growth and colour and being in a very clean state.

“Manuring has also been carried out much more extensively than formerly, and by its aid and the improved cultivation methods now in use, a good crop should result from this area. In a number of places plants obtained from the South Johnstone Experiment Station were noticed growing, and thus their suitability for local conditions can be ascertained by the interested farmers. Taking the Babinda area all around, its recent growth is most noticeable. Good roads are now being made to all of the outside areas.

“*Cairns and Hambledon Districts*.—Most of the cane seen in these areas also looks well. Near Kamma some very fine D.1135, both plant and ratoon, was noticed. This soil seems to suit this variety pretty well. No signs of grubs are apparent.

“For the past year Hambledon mill crushed 87,000 tons. By the present appearance of the crops, and also the fact that the Freshwater cane is now due for the mill, these figures should be easily exceeded for 1922.

“*Herbert River District*.—This centre was visited early in February. Up to that time the total rainfall for the year amounted to 2.82 in. Conditions, however, changed, as very heavy rain set in upon the 11th instant, continuing without intermission for six days, aggregating a total of 32.16 in. up to the 17th instant, or giving a daily average fall of 5.36 in. This torrential downpour meant that a very large portion of the cane areas was under water for some days, and it was impossible to say how the crops had fared at the time of my departure from the district. Prior to this fall, although short of rain, the crops generally looked very green and healthy, and the outlook for a successful season was most promising.

“A very large amount of liming, green manuring, and fertilizing is being carried out. Some 1,000 tons of earth lime obtained through the Farmers’ League

has been used in preparatory work for this season's crop. This lime seems to be of a very good quality, and can be delivered on the farms at about £2 per ton. Several farmers are using large quantities of the lime; one has had 63 tons, whilst another, besides using about 60 tons, has another 30 tons on order.

"Green manuring has also formed an important part in the cultivation work of the district this year, and some very fine crops of beans are in evidence. Of fertilizers, a very large quantity has been used; but, as most of the farmers order their own, it was difficult to obtain a record of quantities used.

"Of the different varieties of cane grown in the district, H.Q.426 (Clark's Seedling), Badila, H.Q.409, Black Innis, and 7R.428 are the most grown. Probably the two former canes are grown in about the same proportion. A fair quantity of H.Q.409 is also now going in, as are also small quantities of the varieties lately being supplied by the C.S.R. Co., *i.e.*, Nanemo Korpi and Oarambo.

"Although beetles were very numerous in this area a couple of months ago, so far no signs of grubs are apparent.

"*Lower Burdekin.*—This district was reached in the third week of February; the cane looked splendid everywhere. With a continuance of favourable weather conditions, very heavy crops should be harvested on the Burdekin in the coming season. Some of the cane showed remarkably high density returns. During the end of September and throughout October canes such as H.Q. 426, B.208, and Badila were analysing from 19 per cent. c.c.s. to 19.7 per cent. c.c.s. This latter was B208, and was worth the high price of 78s. 6½d. per ton. One grower's return of 800 tons gave him an average of 16.88 c.c.s. The following figures give the average density of green cane treated during the season:—

Variety.	Average c.c.s.
B.208 plant	17.34
Badila ratoons	17.04
Badila plant	16.40
H.Q.426 (Clark's Seedling) plant	16.25
Imperial plant	15.50
Q.813 plant	15.48
N.G.24 plant (Goru)	15.41
Q.903 plant	15.29
24B plant (Goru)	15.22
M.1900 plant	15.18
Q.970 plant	14.83
Q.855 plant	14.48
Malagache plant	13.99
Q.1133	13.10

"Around Kalamia a large area of ground is being got ready for planting, and conditions, generally, are very satisfactory."

The Southern Field Assistant, Mr. J. C. Murray, reports under date 7th March, 1922, as follows:—

"*Mackay.*—In February the Mackay district was visited in connection with the work of the Bureau of Sugar Experiment Stations. Taking the sugar industry as it exists at present in Mackay, one cannot help being struck by the progress the district has made during the last few years, especially regarding agricultural methods and in the employment of improved implements. There is also a larger interest now taken in varieties of cane, and there is a greater desire on the part of many growers to follow out the scientific experiments of the stations as found in the annual reports of the Bureau.

"Taking the sub-areas in detail, I find that immediately around the city of Mackay there are good crops of cane and well-tilled soil. Numbers of farmers have ploughed in cowpea as a green manure, in addition to stimulating their crop with a concentrated fertilizer. Manures are applied in varying quantities per acre, as previous experience or local experiments dictated. The application of lime is more general than hitherto, mostly taking the form of pulverized limestone.

"The canes giving the best monetary returns to the grower are H.Q.426, Q.813, D.1135, 190 Seedling, and Badila. All gave high c.c.s. values this year. It is advisable for those farmers who are growing 1900 Seedling not to cut too early. October is a good month to harvest this variety.

"More subsoiling could be done in the sub-area under review. Soil well loosened down to a depth of, say, 20 in. has greater water-conserving properties in dry weather and allows of a deeper root system.

"Cane pests have done a minimum of damage here this season. Farmers have reported minor destruction of cane plants by grubs and wire worms, but nothing of a serious nature.

"Further up the Pioneer, towards Marian and Pleystowe, good crops of cane are in evidence. At the former place a little striped leaf disease is showing in H.Q.426, and may account for the fluctuating c.e.s. tests that are occasionally mentioned. Canes doing particularly well at these two places are 1900 Seedling, Malagache, and Q.813. A small area is under H.Q. 285, and is looking well. This cane, grown in conjunction with 1900 Seedling, should be profitable on account of its early maturing qualities. Q.813 is a cane that has come to stay in these farm areas, and will probably become a staple variety.

"A visit was paid to the Mount Jukes district. There is some very good sugar-land in this area, and settlers who are already there are doing well. The Marian Sugar Milling Company has a tramline tapping the best land; and, judging by the cane growth and quality of the cleared land (soil of a rich dark loam, heavy in humus), should take a lot of cane from this locality.

"Good conditions prevail on Cattle Creek. Grubs have been giving the growers a little trouble, but no great financial loss has been experienced. There is some magnificent cane-producing soil both here and on Owen's Creek. The line is being pushed rapidly over the route of the Gargett-Owen's Creek Railway, much to the satisfaction of the settlers.

"With the exception of a little more cultivation, and, perhaps, lime, it would be difficult to improve much of the Pinnacle Plain country; that is, where the cane is grown. The soil is a heavy dark loam, very rich in humus, and well drained. Varieties that are growing well are D.1135, Clark's Seedling, Badila, and 1900 Seedling. In harvesting the latter variety, farmers are advised not to cut before October. Farmers find the D.1135 the most resistant to cane-grub attack.

"At the time of visiting this area, the various streams were running clear and strong, while the tropical jungle on the mountain slopes shone a vivid green. The weather was very hot and humid.

"At Eton the farmers are satisfied with their industry. High values have been obtained for the cane, and the people are more contented in their hard and continuous work under tropical suns than they have been for years.

"Very little industrial trouble has been recently experienced. Indeed, this applies to the whole of the Mackay district.

"The following are some of the 'densities' from cane sent to Eton Mill, supplied by Mr. Jackson:—

H.Q.426	..	..	..	17.1 (Plant crop 30 tons per acre)
Q.813	..	..	..	16.5 (Plant crop 35 tons per acre)
B.147	..	..	..	14.3 (Plant crop 30 tons per acre)
Q.855	..	..	..	14.3 (1st ratoons)
M.1900	..	..	..	13.1 (Plant crop 30 tons per acre)
B.208	..	..	..	16.1 (Plant crop 30 tons per acre)
N.G.15	..	..	..	16.5 (Plant crop 34 tons per acre)
Green Goru	..	..	..	14.1 (Plant crop 30 tons per acre)

"Other canes that are doing well for the growers in the Eton district are D.1135, Malagache, Q.903, and Q.970.

"The farmers here, generally speaking, are up to date in their methods, although deeper cultivation and green manuring are necessary. The growers met were anxious to receive and impart information.

"At Homebush the cane growth indicates a promising yield for next season. The cane has, so far, received no check from adverse weather conditions or disease. The cultivation is uniformly good, but the texture and producing powers of the soil would be increased by the use of vegetable manures. Lime is also required, as indicated by several tests made in a petri dish with litmus papers.

“Varieties doing well include H.Q.426, M.1900, Q.813, H.Q.285, ‘Pompey’ (a cane introduced by the C.S.R. Company), D.1135, and Malagache. As the growers here will be paid in the future on c.c.s., the canes most profitable would probably be 1900 Seedling, Q.813, and H.Q.285. In common with the previously mentioned canegrowing areas, Sarina is preparing for a heavy crushing. Right up the fertile flats on Plane Creek the cane is making a rapid growth, with a minimum of disease or insect parasite interference. This latter is largely due to care taken in plant selection—the only safe way to prevent the spread of insidious diseases such as ‘gumming’ and ‘striped leaf disease.’ The more careful a grower is in plant selection, the more likely he is to have a uniform density in the crushing.

“A considerable amount of fertilizing is being done on the Plane Creek areas. The farmers are discussing the question of going in more extensively for this in the future.

“Varieties showing good growth are D.1135, M.1900, H.Q.426, H.Q.285, and Q.813. All these canes are making weight rapidly. The cultivation is good on Plane Creek at present.

“North of Mackay the Farleigh country is showing the effect of the good growing weather. The different varieties are making cane satisfactorily, and the farmers anticipate a good season. Fertilizers (principally sulphate of ammonia applied between the light showers of rain that have been constantly falling) are being used to stimulate growth. Practically no disease is in evidence. Grubs were causing minor losses, but nothing to worry the farmer seriously. If the infestation increases through the year, the planting of D.1135 as a resistant variety would be advisable; also the trial of repellants, such as carbon bisulphide.

“Varieties doing well are Q.813, M.1900, M.187, M.87, H.Q.426, and H.Q.285. The mill is anticipating a big supply of cane next season from the Homebush areas, and the crushing for this plant should be a record one.”

HORTICULTURAL NOTES.

By E. W. BICK, Curator, Botanic Gardens.

Chrysanthemums should now be showing flower buds, and will benefit greatly with a little liquid manure once or twice a week. Towards end of month dahlias will be going down. Don't disturb them too soon. Should the ground be required they may be removed to a sheltered situation and heeled in to allow bulbs to ripen. This must be done gradually. Don't cut off tops when in a green state; it weakens the bulbs, often killing them. Some of the free-flowering pæony dahlias, notably the Geisha, make very weakly bulbs that, if disturbed before being properly ripened, are apt to die out. Many dahlia-growers have lost the Geisha. It is rather a ticklish thing to winter. The safest plan is to allow it to remain in its flowering position until thoroughly ripened, or, if in a well-drained position, it may be left until next planting season.

Stocks may now be planted out. Like many other plants of this natural order (Cruciferae—cabbage family), particularly cauliflower, they delight in newly cultivated ground. Garden beds that have been growing flowers continually for many years should have the soil renewed for these crops. Although it may have been frequently manured, a change of soil is necessary. This is often unobtainable except at very heavy expense. Another danger is that nut grass or some other obnoxious pest may be introduced in the new soil. A plant that should be more grown for soil renovation is the lupin. They may be obtained in many attractive colours, and the root action of lupins improves the soil, apparently by bacterial action, very much.

Another sowing of sweet pea seed should be made. The later planted ones often do well. The weather is cooler, growth stronger, and better flowers may be looked for.

This is a good time to plant bouvardias. These beautiful flowering plants can be obtained in many colours and varieties. They have not been grown much of recent years about Brisbane, but they are well worth a trial. A good, free soil, similar to that carnations are grown in, suits them best.

Seeds of winter and spring flowering annuals may still be sown, and plants of those from seeds planted should be planted out. Keep the soil well cultivated about newly planted annuals.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR FEBRUARY, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Prim	Holstein ...	6 Feb., 1922	1,369	3·8	58·01	
Lute	Ayrshire ...	8 Jan. ,,	1,081	4·2	52·36	
Lady Annette ...	,, ...	2 Jan. ,,	888	4·6	48·48	
College Evening Glow	Jersey ...	10 Oct., 1921	712	5·6	47·68	
College Cold Iron	,, ...	25 Jan., 1922	760	5·2	47·42	
Thyra of Myrtle-view	Ayrshire ...	31 July, 1921	1,035	4·0	46·24	
Lady Mitchell ...	Holstein ...	20 Dec. ,,	872	4·4	41·78	
Little Buttercup...	,, ...	12 Dec. ,,	1,174	3·4	43·23	
Glow VI.	Guernsey ...	28 Aug. ,,	566	6·2	41·64	
Auntie's Lass ...	Ayrshire ...	31 Oct. ,,	1,042	3·6	41·60	
Buttercup	Shorthorn...	28 Oct. ,,	981	3·8	41·49	
Hedges Madge ...	Holstein ...	15 Aug. ,,	802	4·4	41·18	
Iron Plate	Jersey ...	12 July ,,	780	4·4	41·16	
Magnet's Leda ...	,, ...	8 Feb., 1922	707	4·6	38·64	
College Promise ...	,, ...	6 Jan. ,,	673	4·6	36·98	
College Mignon ...	,, ...	7 July, 1921	679	4·6	36·59	
College Prima Donna	Holstein ...	17 Nov. ,,	730	4·2	35·82	
Skylark	Ayrshire ...	7 Feb., 1922	660	4·6	35·52	
College Bluebell ...	Jersey ...	22 Oct., 1921	762	4·1	34·96	
College St. Margaret	,, ...	25 Sept. ,,	634	4·6	34·77	
College Ma Petite	,, ...	5 Feb., 1922	539	5·2	32·77	
Lady Meg	Ayrshire ...	25 Jan. ,,	767	3·8	32·60	
Netherton Belle ...	,, ...	30 Nov., 1920	471	5·8	31·89	
Bellona	,, ...	26 June, 1921	697	4·0	31·18	
Nina	Shorthorn...	11 Nov., 1921	713	3·8	30·16	
Yarraview Village Belle	Guernsey ...	6 Aug. ,,	365	7·4	30·16	
Yarraview Snow-drop	,, ...	14 Oct. ,,	505	5·0	29·25	
Miss Betty	Jersey ...	7 July ,,	565	4·2	27·51	
Miss Security ...	Ayrshire ...	20 Aug. ,,	753	3·2	26·46	
College Wildflower	Jersey ...	10 Dec. ,,	622	3·6	24·92	
Sweet Meadows ...	,, ...	31 Oct. ,,	425	5·2	24·38	
College Meadow Sweet	Holstein ...	17 May ,,	487	4·2	24·29	
Gatton Glitter ...	Guernsey ...	9 Sept. ,,	546	3·8	23·28	
College Sunrise ...	Jersey ...	12 June ,,	445	4·4	23·23	
Rosine	Ayrshire ...	19 Jan. ,,	446	4·4	23·23	
Mistress May ...	,, ...	3 Dec. ,,	571	3·6	22·80	
Hedges Dutchmaid	Holstein ...	26 May ,,	399	4·6	22·08	
College Grandeur	Jersey ...	29 Dec., 1920	380	4·8	21·88	
Thornton Fairetta	,, ...	15 Mar. ,,	322	5·8	21·71	
Miss Fearless ...	Ayrshire ...	26 May ,,	452	4·0	20·19	
Lady Loch II. ...	,, ...	31 Jan., 1922	451	4·0	20·15	
Comedienne	Jersey ...	26 Nov., 1920	387	4·4	20·06	
Leda's Jessie ...	,, ...	11 Jan., 1922	318	5·4	20·04	

General Notes.

THE SUGAR INDUSTRY.

ITS IMPORTANCE TO THE STATE.

THE PREMIER'S REVIEW.

In the course of a statement made on 16th March to the Press the Premier, the Hon. E. G. Theodore, reviewed the very important bearing the Southern agitation for the decontrol of the sugar industry has upon State and industrial interests. The statement related to the agenda of the annual meeting of the Associated Chambers of Commerce of the Commonwealth about to take place at Hobart, at which it was proposed to table motions urging the decontrol of the sugar industry, and was made with a view to acquainting the general public with the actual position of the industry and the attitude of the Queensland Government, which is a party to the existing agreement.

The Paramount Importance of the Sugar Industry.

The points made by the Premier in the course of his statement are epitomised as follows:—

The maintenance of the sugar industry and of its reasonable prosperity is of paramount importance to the State.

Canegrowing is Queensland's chief agricultural industry and the greatest wage-paying industry in the State.

Its maintenance is therefore one vitally affecting the industrial fabric of the State.

The Queensland Government will strongly resist by every legitimate means any action which would result not only in injury to the farmers, workers, and others concerned, but in retarding the settlement of tropical and subtropical regions of the State.

The interests of fruitgrowers run on parallel lines with those of sugar producers.

The big manufacturing interests in the Southern States are using the fruit-growers as pawns in their game of self-advantage.

It is noteworthy that the Queensland fruitgrower does not join in the Southern chorus against the Queensland sugar industry, for the reason that he knows the real position and realises that his interests and those of the sugar producer are common.

It appears remarkable that, whilst there is so much publicity regarding the need for land settlement within the Commonwealth, there is at the same time such bitter hostility in the South towards the only industry which can settle our Northern littoral.

£15,000,000 Involved.

It may be safely said that not less than £15,000,000 is involved in the sugar industry.

The value of raw sugar manufactured in Australia last season approximated £9,000,000, of which £6,000,000 was disbursed in wages.

At present deflated prices, decontrol would entail sending over £6,000,000 annually out of Australia for black-grown importations.

From a White Australia point of view it should be realised that there are 25,000 persons directly engaged in the industry and many of the towns of North Queensland are actually dependent upon sugar.

Probably some 100,000 persons are directly or indirectly dependent upon the industry.

Decontrol would seriously affect the welfare of some 4,000 Southern seasonal workers and coastal shipping.

The War Value.

The industry is entitled to some recognition for its war value in supplying at controlled rates raw material for the large export trade in jams, preserved milk, and other commodities built up during the war.

Its Land Settlement Value.

£1,000,000 has been invested in new sugar mills in the North in recent years. £40,000 has been expended to date on the Maria Creek Returned Soldiers' Settlement, which is solely a canegrowing area.

The Herbert River and Johnstone River have, as a result of the growth of the sugar industry, increased their population by 15,000, the greatest proportionate increase in rural Australia.

Our Northern lands can be stabilised only by wise and far-seeing methods, and one such method is that of a continuance of Commonwealth control and a renewal of the sugar agreement.

With such an agreement there is no reason why sugar should not be retailed at a lower price without endangering settlement in the North, the rural population in the South, or the White Australia ideal.

The reasons governing the control of the sugar industry in 1915 exist with undiminished force to-day.

[Apropos of the foregoing the Congress of Associated Chambers of Commerce at Hobart carried a motion favouring decontrol of the sugar industry by the Federal Government, the voting being: For decontrol 24, against 20. The Queensland delegates fought hard for the retention of Government control.—ED.]

SHOW DATES, 1922.

Show society secretaries are invited to forward for insertion in this list dates of forthcoming shows. Alterations of dates should be notified without delay.

Toowoomba: 4th and 6th April.
 Sydney Royal: 10th to 19th April.
 Chinchilla: 11th and 12th April.
 Herberton: 17 and 18th April.
 Miles: 19th April.
 Nanango: 20th and 21st April.
 Ascot: 22nd April.
 Goondiwindi: 25th and 26th April.
 Kingaroy: 26th and 27th April.

Longreach: 2nd and 3rd May.
 Wondai: 3rd and 4th May.
 Charleville: 3rd, 4th, and 5th May.
 Toogoolawah: 4th and 5th May.
 Grafton: 3rd to 6th May.
 Blackall: 9th and 10th May.
 Miriam Vale: 9th and 10th May.
 Mitchell: 10th and 11th May.
 Boonah: 10th and 11th May.
 Murgon: 10th and 11th May.
 Roma: 16th and 17th May.
 Emerald: 17th and 18th May.
 Kilkivan: 17th and 18th May.
 Ipswich: 17th and 18th May.
 Wallumbilla: 23rd and 24th May.
 Maryborough: 23rd to 26th May.
 Hughenden: 23rd and 24th May.
 Springsure: 24th and 25th May.
 Lowood: 25th and 26th May.
 Childers and Beaudesert: 30th and 31st May.

Bundaberg: 1st to 3rd June.
 Marburg: 2nd and 3rd June.
 Brookfield: 3rd June.
 Cairns: 7th and 8th June.
 Gin Gin: 7th and 8th June.
 Woombye N.C.A.H.S.: 7th and 8th June.
 Mount Larcom: 9th and 10th June.
 Gladstone: 15th and 16th June.

Rockhampton: 22nd, 23rd, and 24th June.
 Esk: 28th and 29th June.
 Mundubbera: 29th and 30th June.

Mackay: 30th June and 1st July.
 Gayndah: 4th, 5th, and 6th July.
 Nambour: 5th and 6th July.
 Townsville: 5th and 6th July.
 Charters Towers: 12th and 13th July.
 Gatton: 12th and 13th July.
 Proserpine: 13th, 14th, and 15th July.
 Rosewood: 19th and 20th July.
 Caboolture: 20th and 21st July.
 Mount Gravatt: 22nd July.
 Barcaldine: 25th and 26th July.
 Crow's Nest: 26th July.
 Pine Rivers: 28th and 29th July.
 Wellington Point: 29th July.

Sandgate: 4th and 5th August.
 Royal National: 7th to 12th August.
 Belmont: 19th August.
 Murrumbidgee: 22nd to 24th August.
 Coorparoo: 26th August.
 Kenilworth: 31st August.

Beenleigh: 1st and 2nd September.
 Zillmere: 1st and 2nd September.
 Gympie: 7th, 8th, and 9th September.
 Wynnum: 9th September.
 Imbil: 13th and 14th September.
 Laidley: 13th and 14th September.
 Sherwood: 16th September.
 Rocklea: 23rd September.
 Kilcoy: 28th and 29th September.

Esk Camp Drafting: 4th and 5th October.
 Pomona: 4th and 5th October.
 Southport: 6th October.
 Enoggera: 7th October.

Farm and Garden Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Cleveland, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. Growers are advised that all cotton in the Central District should be consigned to the Australian Cotton-growing Association, Rockhampton; whilst those in the Southern areas should consign their cotton to the Association at Whinstanes, Brisbane. All bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

KITCHEN GARDEN.—Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleaned, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large enough, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

FLOWER GARDEN.—Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pentstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

Orchard Notes for May.

THE COAST DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become specked or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally as important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from $2\frac{1}{4}$ to $2\frac{1}{2}$ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply-cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. in diameter in a single layer.

Slowly acting manures—such as meatworks manures—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines, as the later vines are pruned in the season the better in the Granite Belt District, as late pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manures—such as Ground Island Phosphates or Basic Phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for the use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.
AT WARWICK.

1922.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.2	5.50	6.18	5.20	6.36	5.3
2	6.3	5.49	6.18	5.19	6.36	5.3
3	6.3	5.48	6.19	5.18	6.37	5.3
4	6.4	5.47	6.20	5.17	6.37	5.3
5	6.5	5.45	6.21	5.17	6.38	5.2
6	6.5	5.44	6.22	5.16	6.38	5.2
7	6.6	5.43	6.22	5.16	6.39	5.2
8	6.6	5.42	6.23	5.15	6.39	5.2
9	6.7	5.41	6.23	5.14	6.40	5.2
10	6.7	5.40	6.24	5.14	6.40	5.2
11	6.8	5.39	6.25	5.13	6.41	5.2
12	6.8	5.38	6.25	5.13	6.41	5.2
13	6.9	5.37	6.26	5.12	6.42	5.2
14	6.9	5.36	6.26	5.12	6.42	5.2
15	6.10	5.35	6.27	5.11	6.42	5.3
16	6.10	5.34	6.27	5.10	6.42	5.3
17	6.11	5.33	6.28	5.10	6.42	5.3
18	6.11	5.32	6.28	5.9	6.43	5.3
19	6.12	5.31	6.29	5.9	6.43	5.4
20	6.12	5.30	6.29	5.8	6.43	5.4
21	6.13	5.29	6.30	5.8	6.43	5.4
22	6.13	5.28	6.31	5.7	6.43	5.4
23	6.14	5.27	6.31	5.7	6.43	5.4
24	6.14	5.26	6.32	5.6	6.44	5.4
25	6.15	5.25	6.32	5.6	6.44	5.4
26	6.15	5.24	6.33	5.5	6.44	5.5
27	6.16	5.23	6.33	5.5	6.44	5.5
28	6.16	5.22	6.34	5.4	6.44	5.5
29	6.17	5.22	6.34	5.4	6.44	5.5
30	6.17	5.21	6.35	5.3	6.44	5.6
31	...	...	6.35	...	...	...

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

		H. M.
5 April	(First Quarter	3 46 p.m.
12 "	○ Full Moon	6 44 a.m.
19 "	) Last Quarter	10 54 a.m.
27 "	● New Moon	3 4 p.m.

Perigee on 10th at 6.36 p.m.

Apogee on 22nd at 8.12 p.m.

The moon will pass, apparently, close to Jupiter on the 11th soon after sunset. If viewed from a higher southern latitude the moon will be seen to occult the planet.

4 May	(First Quarter	10 56 p.m.
11 "	○ Full Moon	4 6 p.m.
19 "	) Last Quarter	4 17 a.m.
27 "	● New Moon	4 4 a.m.

Perigee on 8th at 5.12 p.m.

Apogee on 20th at 2.30 p.m.

On the 8th, between 11 and 12 p.m., the moon will be again very near, apparently, to Jupiter in the constellation Virgo, with the very interesting binary star—Gamma Virginis—slightly below them.

3 June	(First Quarter	4 10 a.m.
10 "	○ Full Moon	1 38 a.m.
17 "	) Last Quarter	10 3 p.m.
25 "	● New Moon	2 20 p.m.

Perigee on 4th at 5.12 a.m. and on 29th at 1.24 p.m.

Apogee on 17th at 9.18 a.m.

The moon will pass Saturn on the 4th at a quarter past three in the afternoon, and will enable this planet to be seen in the daytime if a small telescope or binoculars are directed about six times the moon's diameter northward. It will also pass Jupiter on the 5th a little before four o'clock in the morning, again in apparent proximity to Gamma Virginis. Jupiter will again be occulted in high southern latitudes.

Venus, Jupiter, and Saturn will be evening stars during these three months. Mars will be somewhat later in rising, but will be visible early in the evening during the latter part of the period.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

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PART 5.

THE GERMINATION AND PURITY OF SEEDS SOLD IN MADE UP PACKETS.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

Under the Pure Seeds Acts, the vendor of all seeds sold in made-up parcels is required to clearly and indelibly mark upon the outside of each packet *the year when the seeds were grown*. The buyer is thus able to make some discrimination in his purchases. It is well to remember that vegetable seeds differ from wine in that they are *not improved by age*.

All vegetable seeds offered for sale as seeds for sowing must comply with the Pure Seeds Acts as regards purity and germination. For the purposes of the Pure Seeds Acts, all impurities come under the definition of "Foreign Ingredients," which includes dead and non-germinable seeds, inert matter (such as dust, stones, or any material other than seeds), and seeds of weeds or seeds of any plant other than seeds of the kind to which the parcel or packet purports to belong. Diseased or insect-infested seeds are prohibited.

The following table gives the amount of dead and non-germinable seeds, inert matter, weed seeds, &c., that may be contained in the seeds mentioned:—

PROPORTION OR AMOUNT OF FOREIGN INGREDIENTS PRESCRIBED FOR
VEGETABLE SEEDS.

Kind of Seeds.	Inert Matter.	Seeds of Weeds or Seeds of any kind other than that to which the sample purports to belong.	Diseased or insect-infested Seeds.	Dead and non-germinable Seeds.
	Per cent.	Per cent.	Per cent.	Per cent.
Asparagus	2	1	Nil	50
Beans	2	1	Nil	25
Beet	2	1	Nil	45*
Cucumber	2	1	Nil	30
Cabbage	2	1	Nil	35
Cauliflower	2	1	Nil	40
Carrot	2	1	Nil	45
Cress	2	1	Nil	40
Celery	2	1	Nil	50
Kohl Rabi	2	1	Nil	35
Lettuce	2	1	Nil	35
Leek	2	1	Nil	50
Marrow	2	1	Nil	30
Melon	2	1	Nil	35
Mustard	2	1	Nil	30
Marjoram	2	1	Nil	50
Onion	2	1	Nil	40
Peas	2	1	Nil	20
Parsnip	2	1	Nil	70
Parsley	2	1	Nil	50
Pumokin	2	1	Nil	35
Radish	2	1	Nil	40
Swede	2	1	Nil	35
Sweet Corn	2	1	Nil	25
Spinach	2	1	Nil	50
Sage	2	1	Nil	50
Turnip	2	1	Nil	35
Tomato	2	1	Nil	35

INVOICE MUST BE GIVEN BY VENDOR.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

“The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds.”

Subtropical and tropical climates are usually associated with high temperatures and excessive moisture, which gives rise to conditions causing rapid deterioration.

Experiments have proved that moisture is the chief factor in loss of germinating power. It is therefore essential that both buyers and sellers should store all seeds under the driest and coolest possible conditions.

Before putting any seeds up in packets, it is advisable to dry them for a few days at a slightly higher temperature than that to which they will be submitted during subsequent storage. If this is not done, any rise in temperature above that of the place where the seeds were packed will liberate moisture within the packet and cause deterioration.

Although the life of a seed is undoubtedly dependent on many causes, the most important factor governing the storage of seeds without excessive loss of vitality is dryness.

Should the vendor of any seeds have a complaint regarding their purity or germination, it is advisable to at once send samples of the seeds in question to the Department of Agriculture. Three unopened packets of vegetable seeds is the quantity required for a sample of seeds in made-up parcels. The vendors' fee for analysis is 2s. 6d. per sample. A vendor is—

“Any person who sells, or offers or exposes for sale, or contracts or agrees to sell or deliver any seeds.”

FREE ANALYSIS.

No charge is made to persons sending in samples of any vegetable seeds purchased by them for their own sowing, providing the following particulars are plainly written on each sample:—

Vendor's name and address.

Name of seed.

Quantity purchased.

Date of delivery.

Locality where seed is to be sown.

Name and address of purchaser.

All samples with *covering letter*, should be addressed to—

The Under Secretary,

Department of Agriculture and Stock,
Brisbane.

COMBAT AND CONTROL OF CANE PESTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report, dated 9th March, 1922, from the Entomologist (Mr. E. Jarvis):—

“Intense heat during the month of February, accompanied by abundant rain at intervals, has somewhat interfered with outside work; but, on the whole, laboratory experiments give promise of success in the field later on. As already pointed out in 1915 (“Queensland Agricultural Journal,” vol. iii., p. 220), one of the best forms of control against the grub stage consists (in the writer's opinion) of the application to cane sets or furrows, at planting time, of some inexpensive deterrent sufficiently obnoxious and durable to protect a limited area containing the main roots from invasion during most of the growing period.

“Another promising remedy is fumigation of the soil with some gas that, while deadly to animal life, is harmless to cane plants, and possesses, if possible, a manurial value.

“Fumigation with carbon bisulphide, for instance, would come under the latter remedial method, and therefore some attention has been given during the last couple of months to field experimentation with this well-known fumigant. With regard to the former method of control by means of obnoxious repellants, this matter is being closely studied, several chemical preparations having been tested up to the present

with varying measures of success. We are working towards the discovery of a substance possessing an odour of such durability as to allow of its influence being exercised in the soil throughout a period of three months or longer. If put into the drills along with cane sets when planting, say in September, a substance of this nature would have time to render the soil around cane-stools sufficiently disagreeable to probably act as a repellant to beetles entering the field to oviposit during November or December.

“One of the preparations being tested here at present, and consisting of a combination of certain chemicals, is not only repellant, but possesses the additional advantage of being fatal to animal life. Grubs confined in cages holding about 40 cub. in. of soil that had been treated with a small injection of this chemical substance were found to be semi-paralysed after forty-eight hours, and died in from three to five days. Under field conditions, however, we must expect to meet with many obstacles in the way of success, some of which, if found to be insurmountable, might necessitate a modification or even the abandonment of a particular line of research.

“POISON BAITS FOR CANE-GRUBS.

“Now that grubs are becoming plentiful, we intend to further investigate the possibilities ahead of this phase of cane-grub control. The only previous attempt in a similar direction was made in 1916, an account of which is given in Bulletin No. 4 of our Division of Entomology. At the time this was published, arsenate of copper (Paris green) was discovered to be more deadly than white arsenic. Cowpea leaves dusted with the former arsenical were readily devoured by grubs of the grey-back beetle, and proved fatal to about 58 per cent. after one week, 75 per cent. after fifteen days, and 100 per cent. after the lapse of twenty-five days.

“These results, which were obtained in cages at the laboratory, were thought sufficiently conclusive to warrant preliminary field tests. The matter, however, was never fully investigated, and of late years the evident claims of this arsenical were set aside in favour of white arsenic, which, although cheaper, is less effective. The recent failure of various test-plots treated with white arsenic in canefields around Meringa should, I think, be attributed mainly to the methods of application adopted. In the writer's opinion, white arsenic applied loosely in the drills in even greater quantities than 200 lb. per acre would not prove effective against cane-grubs, for the simple reason that, when chancing to ingest a portion of such treated soil, the amount swallowed would often contain only a mere fraction of the arsenical; moreover, each shower of rain would tend to wash the minute particles of arsenic downwards, thereby causing additional and far greater adulteration with the soil. Thus it becomes imperative, if we would secure good results, to administer the poison in as concentrated a form as possible; and with this end in view, we are studying the effects upon cane-grubs of various methods of placing the bait. Later on, during the planting season, the more promising of these methods will be tested by means of experiment plots in the field.

“RANGE OF FLIGHT OF THE CANE-BEETLE.

“The topographical conditions of the country around Gordonvale probably play an important part in the distribution of this formidable cane-beetle, and, in the writer's opinion, may even be responsible for its occurrence in overwhelming numbers on certain restricted areas.

“We know that in many kinds of insects migration of the adult form often becomes necessary to the persistence of a species, and may at times lead to its excessive increase. Our canebeetle, for example, when chancing to occur in exceptional quantities over a small area, does not, I think, remain and breed there, unless imprisoned, as it were, by mountain ranges lying to leeward of the trade wind, knowing instinctively the many dangers that threaten crowded numbers; but generally migrates, if possible, in order to distribute its eggs more widely and establish the grubs in a varied assortment of soils, thereby reducing the percentage of mortality caused by parasitic and predaceous foes. Many strongly-winged insects enjoy a very extended range of flight, certain grasshoppers, butterflies, and moths affording familiar examples.

“Weakly fliers, on the other hand, including the beetle under consideration, are forced to rely chiefly on the wind as a means of transport, the measure of success achieved by a species being dependent, of course, on its size, strength, and degree of buoyancy.

“The grey-back cockchafer, which is about $1\frac{1}{4}$ in. long and of somewhat bulky proportions, would seem, at first sight, quite unfitted for extended aerial transportation; but while studying the anatomy of this insect in 1916, I was surprised to discover that related scarabacidae of smaller size were heavier than this species.

“It has been estimated that one pound of grey-back beetles represents about 216 specimens; so that, in spite of its bulk, a single individual would weigh, on an average, only 2 scruples—viz., the weight of an ordinary wine-cork.

“The so-called ‘Christmas Beetle’ (*Anoplognathus boisduvali*), an insect scarcely half as big, proved slightly heavier; while a rutelid beetle (*Calvodes grayanus*), although not three-quarters the size of *albohirtum*, turned the scale at about 2½ scruples. These differences in weight, which were determined from living specimens, are due to variations in the consistency of the harder portions of the body known as the other skeleton, which in the grey-back cockchafer are so thin as to be almost leathery in texture, but in *boisduvali* and *grayanus* are comparatively thick and horny.

“As a general rule, weakly flight, coupled with large size, tends to retard the spread of moderately heavy insects, but where such drawbacks are associated with unusual bouyancy, they are likely to aid rather than hinder rapid distribution, especially when, as in the present instance, bulk is accompanied by a proportionate expanse of wing. In short, it appears likely that the dispersion of our cane-beetle and its occurrence locally in concentrated numbers should be attributed primarily to influences of a meteorological nature, operating in conjunction with such factors as the mechanical condition of soils, character and disposition of timber, and, more especially, the geographical situation of the higher lands and mountain ranges.”

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MARCH, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter	Remarks.
			lb.	%	lb.	
Gay Lassie ...	Ayrshire ...	20 Feb., 1922	1,244	5.0	73.43	
Prim ...	Holstein ...	9 Feb. "	1,452	3.8	64.69	
Snowflake ...	Shorthorn...	20 Feb. "	1,041	5.2	63.95	
Little Buttercup...	Holst-in ...	12 Dec., 1921	1,107	4.6	60.00	
Auntie's Lass ...	Ayrshire ...	31 Oct. "	969	4.2	47.83	
Lute ...	" ...	8 Jan., 1922	1,073	3.8	47.81	
College Ma Petite	Jersey ...	5 Feb. "	775	5.2	47.40	
College Cold Iron	" ...	25 Jan. "	785	5.0	46.32	
Thyra of Myrtle-view	Ayrshire ..	31 July, 1921	823	4.4	42.62	
Magnet's Leda ...	Jersey ...	8 Feb., 1922	878	4.0	41.29	
Skylark ...	Ayrshire ...	7 Feb. "	954	3.6	40.24	
Lady Annette ...	" ...	2 Jan. "	737	4.6	39.94	
Lilia ...	" ...	3 Mar. "	797	4.2	39.34	
Hedges Madge ...	Holstein ...	15 Aug., 1921	832	4.0	39.08	
Lady Mitchell ...	" ...	20 Dec. "	676	4.6	36.62	
Buttercup ..	Shorthorn...	28 Oct. "	968	3.2	36.13	
College St. Margaret	Jersey ...	25 Sept. "	580	5.2	35.62	
College Wildflower	" ...	10 Dec. "	572	5.2	35.12	
College Bluebell ...	" ...	22 Oct. "	696	4.2	34.35	
Glow VI. ...	Guernsey ...	28 Aug. "	528	5.4	33.70	
College Mignon ...	Jersey ...	7 July "	622	4.2	30.70	
Lady Meg ...	Ayrshire ...	25 Jan. "	727	3.6	30.66	
College Evening Glow	Jersey ...	10 Oct. "	639	4.0	30.00	
Iron Plate ...	" ...	12 July "	746	3.2	27.84	
College Nita ...	Holstein ...	26 Feb., 1922	694	3.4	27.56	
Miss Security ...	Ayrshire ...	20 Aug., 1921	649	3.6	27.56	
Lady Loch II. ...	" ...	31 Jan., 1922	525	4.4	27.19	
College Prima Donna	Holstein ...	17 Nov., 1921	680	3.4	27.01	
Bellona ...	Ayrshire ...	26 June "	559	4.0	26.25	
College Sunrise ...	Jersey ...	12 June "	410	5.2	25.18	
Nina ...	Shorthorn...	11 Nov. "	595	3.6	25.10	
Miss Betty ...	Jersey ...	7 July "	470	4.4	24.34	
Netherton Belle ...	Ayrshire ...	30 Nov., 1920	398	5.0	23.48	
Miss Saffron ...	" ...	20 Feb., 1922	540	3.6	22.78	
Mistress May ...	" ...	3 Dec., 1921	511	3.8	22.77	
Yarraview Snow-drop	Guernsey ...	14 Oct. "	398	4.8	22.49	
Comedienne ...	Jersey ...	26 Nov., 1920	352	5.4	22.44	
College Promise ...	" ...	6 Jan., 1922	543	3.4	21.77	
Yarraview Village Belle	Guernsey ...	6 Aug., 1921	315	5.6	20.86	
Songstress ...	Ayrshire ...	4 Mar. "	319	5.4	20.36	
College Desire ...	" ...	16 Nov. "	376	4.6	20.36	

A SUMMARY OF SOME EXPERIMENTS CONDUCTED WITH SUGAR CANE BY THE BUREAU OF SUGAR EXPERIMENT STATIONS SINCE 1902.—I.

By H. T. EASTERBY, General Superintendent.

Last year (1921) the Bureau of Sugar Experiment Stations completed its twenty-first year of existence. In the course of that period a large number of experiments in cultivation, fertilisation, irrigation, and general husbandry of the sugar-cane plant have been carried out, the results of which are embodied in the twenty-one annual reports of the Bureau. It is recognised that it is an arduous task to wade through twenty-one reports to get at the results of any experiment, and it has been determined to issue a summary of the principal experiments made. This will subsequently be published in bulletin form, together with a summary of the chemical work carried out by the Bureau, mainly in connection with soils, which will be prepared by Mr. George Patten, formerly attached to the Bureau of Sugar Experiment Stations as First Assistant Chemist, but latterly with the Agricultural Laboratory.

DEEP CULTIVATION EXPERIMENTS.

The first experiments were undertaken at the Sugar Experiment Station at Mackay (the soil of which is alluvial and of fair average quality compared with the rest of the district) in order to demonstrate the necessity for, and primary value of, thorough deep subsoil cultivation, it being considered that in alluvial soils such methods of cultivation must precede all other methods for increasing production.

The mode of treatment included:—

1. Breaking up and turning over the land with a swing plough to a depth of not less than 12 inches.
2. The thorough stirring of the subsoil by a subsoil plough to a further depth of 6 to 8 inches, furnishing thus a loose mass of soil 18 to 20 inches in depth. This was later on followed by cross ploughings, the number of ploughings given, exclusive of breaking up, being four.

The experiment also included a similar piece of land of uniform depth and character and part of the same field. This received the treatment usually accorded to land by farmers in the Mackay district, and was a comparison plot.

The land on which the experiments were made was all in one piece and strictly uniform in depth of soil and other characteristics and had not borne crops for some considerable time.

Planting was done at the beginning of April, 1902, the variety of cane used being Rose Bamboo, or Rappoe. The cane was cut into plants having three eyes and laid in drills 5 ft. apart, the distance between the ends of the cane in the drill being 6 in. The cane was covered with 3½ in. of soil. Germination took place in about ten days.

Subsequent cultivation was of a shallow nature not exceeding 3 in. in depth, and was done by the Planet Junior fitted with broad duck-foot hoes. This method is one strongly to be recommended, particularly in dry seasons. Professor King has repeatedly pointed out the efficacy of dry earth mulches in the conservation of soil moisture. Scientific authorities all over the world recommend this cultivation to be so done as to leave a level mulch of soil upon the top, after cutting through the capillary tubes that are leading moisture to the surface. Its importance through a dry period cannot possibly be over-estimated. In his work on soils, Hilgard says:—"The loose tilth of the surface, which is so conducive to the rapid absorption of the surface water, is also, broadly speaking, the best means of reducing evaporation to the lowest possible point. . . . It is true that relatively coarse compound particles are incapable of withdrawing capillary moisture from the dense soil or subsoil underneath, just as a dry sponge is incapable of absorbing any moisture from a wet brick, while a dry brick will readily withdraw nearly all the water contained in the relatively large pores of the sponge. A layer of loose, dry surface soil is therefore an excellent preventive of evaporation and to moderate the access of excessive heat and dryness to the active roots."

During the first eight months of the life of the cane the weather was dry and rainless, the year being the drought year of 1902, but the method of cultivation adopted kept the cane alive till good rain fell in December, which was followed by favourable weather in 1903, when a splendid growth took place and continued.

No fertiliser or irrigation water was applied to either of these experiments.

At the age of eighteen months the cane was harvested, with the following results:—

YIELD OF CANE AND SUGAR PER ACRE FROM SUBSOILED AND NON-SUBSOILED PLOTS.

Method of Cultivation.	Weight of Cane per Acre. English tons.	Weight of Sugar per Acre. English tons.
Deep subsoil cultivation	49·3	6·7
Ordinary cultivation	29·5	3·9

Difference = 19·8 tons per acre.

From a large number of analyses of soils in the Mackay district it has been shown that most of the soils in that district are fair, and some are very high, in total content of lime. This element, however, is in a very insoluble and inactive state. Deep and very thorough cultivation and exposure of the largest possible mass of soil to the air and sun are the most effective means of bringing these large amounts of lime into an available state. In potash, nitrogen, and phosphoric acid the Mackay soils are generally very low.

The cane grown by the deep subsoil and thorough cultivation had higher sucrose, higher purity, lower glucose, and a notably less content of fibre, thus resulting in a higher total amount of obtainable sugar in the cane than the cane grown by "ordinary cultivation." The higher fibre content of the latter is due to the thinner sticks and shorter joints.

Further subsoiling experiments were carried out with ratoon crops from 1905 to 1907. In one series all the ground between the rows was ploughed and subsoiled, while in the other the ground between the rows was simply ploughed to a depth of 8 in. These experiments were carried on over the first, second, and third ratoon crops, and with the exception of the subsoiling all other acts of cultivation were identical. The results from the three crops of ratoons were as under:—

Crops.	Yield of Cane per acre where the ground between the rows was ploughed and subsoiled. English tons.	Yield of Cane per acre where the ground between the rows was only ploughed to eight inches. English tons.
First ratoons	38·9	27·0
Second ratoons	31·3	19·2
Third ratoons	20·4	9·91

These experiments were not fertilised or irrigated.

Further experiments were again made at Mackay with subsoiling, in 1919, which were carried out in the following manner:—

Uniform land was divided into two pieces, the whole being cross-ploughed four times to 12 in., while one-half received a subsoiling with the special implement known as the subsoiler to a further depth of 7 in., making 19 in. in all. The other treatment of the whole of the land was identical. The cane used for plants was Green Goru, or N.G.24B. This crop was planted in April of 1919, and the difference between the subsoiled and unsubsoiled plots was well marked during the whole period of growth in the plant crop and also in the first ratoons.



PLATE 44.—SUGAR LABORATORY, MACKAY.

Below are given the results of the plant and first ratoon crops:—

CROP RESULTS OF SUBSOILING EXPERIMENT—PLANT AND FIRST
RATOON CROP. VARIETY, GREEN GORU (N.G.24B).

Plot.	Treatment.	PLANT CROP, 1920.			FIRST RATOON CROP, 1921.		
		Age of Cane.	Yield of Cane per Acre in English tons.	Yield of Commercial Cane Sugar in English tons.	Age of Cane.	Yield of Cane per Acre in English tons.	Yield of Commercial Cane Sugar per Acre in English tons.
1	Plant Crop subsoiled and Ratoon Crop also subsoiled	17 months	37.1	5.15	12 months	35.8	5.35
2	Plant Crop not sub soiled, and succeeding Crop ratooned by ploughing 9 in. deep	„	28.5	3.85	„	29.9	4.48

Difference in favour of subsoiling on two crops—14.5 tons of cane and 2.17 tons of commercial cane sugar per acre.

Due to the large amount of working that the ordinary or farmer's plot received, the results for this are also good. In ordinary practice it is doubtful if all farmers cross-plough four times to 12 in. deep and thoroughly ratoon to 9 in.

Subsoiling experiments upon the open, porous, red soils of Bundaberg and Isis have never given payable results, so that, as far as the Bureau's experience goes, subsoiling is not recommended on these soils. Upon alluvial soils, and those with clay subsoils, the thorough deep subsoil cultivation pays handsomely.

THE GINDI BEEF SHORTHORN STUD AND HERD.

By H. P. BURNAGE, Manager.

PRESENT CONDITION OF THE CATTLE INDUSTRY.

The cattlemen of this State are feeling the aftermath of the war more than any other primary-producing section of the community. The present parlous condition of the beef industry, brought about by an unprecedented drop in the price of cattle, representing over several millions sterling in the course of comparatively only a matter of months, and the closing down simultaneously of the export market, are circumstances which, when examined from the aspect of cause and effect, are calculated to bring about an inevitable depreciation in the quality and type of the cattle throughout the State, unless concerted action is taken to prevent it.

QUEENSLAND'S LARGE HERDS.

Queensland, with its 6,500,000 cattle and its extensive meatworks in different parts of the State, was eulogised generally during the war for playing its part in contributing a large quota of meat for the troops overseas at a much lower price than that paid for meat purchased elsewhere by the British Government.

Concurrently with the demand for cattle for slaughtering purposes, there was an immediate occasion for the use of bulls which would effect what every cattleman worthy of the name was aiming at—early maturity and improved quality.



PLATE 45.—GINDIE STATE FARM (BEEF SHORTHORN STUD FARM), GENERAL VIEW.

THE NEED FOR IMPROVING AND MAINTAINING QUALITY.

The breeding of stud and herd bulls naturally became a very profitable occupation to those who could cater for the demand for animals possessing the characteristics and prepotency desired.

To-day, owing to the unprecedented slump in values of bulls, in keeping with other classes of stock, there is every likelihood of many breeders of high-class cattle reducing their herds, for the simple reason that station-owners will naturally be obliged to curtail their usual orders for herd bulls owing to stress of circumstances. Although this economic factor cannot be ignored, there are sound reasons for deprecating action which will have a tendency to bring about any depreciation in the quality of the stock about to be bred.

THE ARGENTINE AS A COMPETITOR IN THE WORLD'S MEAT MARKETS.

Whilst a crisis such as the cattle industry is suffering from has to be faced, it is obvious that consideration should be given to what is being effected by our more fortunately situated competitor in the meat trade—the Argentine.

Queensland in the first place has to "freeze" its beef as against the Argentine "chilling" it. Although our natural pastures are admittedly the finest in the world, we are handicapped to some extent by the fact that the Argentine fattens its cattle on alfalfa (lucerne), a food rich in protein (flesh-forming) substances, and where the fields under this crop stretch to an almost illimitable horizon. Immediately on top of these favourable conditions, one must give the Argentine cattle ranchmen the credit for their foresight in purchasing the highest priced stud stock bred in the United Kingdom.



PLATE 46.—ALBANY DUKE OF BEAUFORT 20TH (161 S.H.B. of Q.)
A typical Sire to use for producing early maturing Stock.

WHAT QUEENSLAND CATTLEMEN SHOULD AIM AT.

Queensland's immediate objective should be directed towards herd improvement, the production of deep, evenly fleshed, early maturing, weighty steers, which could be marketed at from two and a-half to three years old—animals which can only be produced by using pure-bred prepotent beef bulls capable, when used with suitable cows, of transmitting characteristics which may be summed up in the one word "quality."



PLATE 47.—GINDIE DUKE OF BEAUFORT 2ND, 375 (S.H.B. OF Q.) AGE 22 MONTHS.
A Promising young Sire of good conformation, type, and early maturing quality.



PLATE 48.—YANDILLA CHERRY DUKE (314 S.H.B. OF Q.), AND PORTION OF FAR-FAMED
BELLTREES HEIFERS USED FOR PRODUCTION OF EARLY MATURING QUALITIES
FOR HERD IMPROVEMENT.

THE GINDIE STUD AND HERD.

OBJECTS.

The formation of this stud and herd was entrusted to the present management by the Department of Agriculture and Stock in 1914, and was established for the purpose of serving the interests of graziers and selectors in Central Queensland, who would have the means readily at hand of building up their herds and, incidentally, of improving the type and quality of the cattle in the district.

VALUE OF INOCULATED CATTLE.

Being in ticky country, care is taken to keep up the toleration to ticks by inoculation with blood from prepared and tested bleeders; consequently, bulls may be taken on to the coastal or intercoastal country without fear of any ill effects or consequences.

AREA OF FARM AND CLASS OF COUNTRY.

The farm, upwards of 10,000 acres in area, is watered by the Nogoa River, and by bores and windmills, and comprises a good balance between rich downs and river country, with an appreciable area of scrub and timbered lands; a portion of the latter is sand-ridge, where the natural feed comes away very quickly after rain.



PLATE 49.—GRASS COUNTRY.

GRASS AND HERBAGE.

The average rainfall amounts to approximately 23 in. per annum, and by far the heaviest falls are experienced in the summer months. The district, of which the farm forms a small part, enjoys an excellent reputation for the natural wealth and richness of its grasses and herbage. Mitchell, Flinders, Panic, Blue Grass, Couch, *Eriochloa* (Early Spring), Sago Grass, and many other popular kinds are met with, according to their natural habitat. The resting of paddocks is practised to give the grasses a chance to re-seed themselves. As many of the *Chloris* family naturally thrive well, attention has been given to the introduction of Rhodes grass to provide a variety of pasture. In most seasons *Chenopodium* (fat hen) obtrudes itself for a time, and makes an excellent standby at certain periods between the herbage and grass seasons.

FODDER SUPPLIES.

The practice of stabling and paddocking bulls between the respective breeding seasons, and the general requirements at other periods in the way of fodder for young bulls and stud animals, calls for ample supplies of both hay and ensilage.

Cultivation is maintained over a sufficient area of land to provide summer-growing fodders for filling the twin reinforced-concrete silos. Wheat and oats are grown as hay crops, and barley as a green fodder and grazing crop.



PLATE 50.—ONE OF THE FAMILY GROUPS.
Bred and mated with Albany Duke of Beaufort 20th (161 S.H.B. of Q.)

BREEDING SYSTEMS.

The stock are classed throughout into stud and family herd groups, with due regard to the mating of certain lines of blood calculated to keep up and improve the desired standard of type and conformation. A rigid system of selection is followed, both for females and males, in order that constitution and quality may be aimed at and maintained. By this means it is possible to ensure that not only are the sires sent out of undoubted purity, but they can be relied upon to perpetuate and project in their progeny that ascendancy of food feeding and early maturing qualities which count for so much in the animal bred for a specific purpose.

The universal adoption of maxims of this character by Queensland cattlemen, and putting them consistently into practice, will soon place the beef industry of the State on a sound footing, and enable the State to compete successfully in the world's markets.

FOUNDATION STOCK.

The animals throughout are good rich colours, reds and roans.

The females chosen for this purpose were—two imported Coates Herd Book heifers; three from the stud of Mr. J. H. Angas, of Collingrove, South Australia; two from Mr. J. Williamson's stud, Lockinver, Victoria; and 175 high-class heifers selected from the far-famed Belltrees herd owned by Messrs. H. E. A. and V. White, of Seone, New South Wales.

The bulls selected comprise the following:—Shenley Marco (imp.) (159 S.H.B. of Q.), Albany Duke of Beaufort 20th (161 S.H.B. of Q.), Lyndhurst Royal Peer 15th (163 S.H.B. of Q.), Beau Blanche 41st (164 S.H.B. of Q.), Grand Duke of Oxford 56th (376 S.H.B. of Q.), Yandilla Cherry Duke (314 S.H.B. of Q.), Yandilla Cherry Duke 3rd (311 S.H.B. of Q.), Wongan Duke of Derrimut (160 S.H.B. of Q.).

Since the inception of the stud some very fine cattle have been bred; numerous prizes have been taken at shows, and the demand for young stock has been consistent. Care is taken to send out only animals for herd improvement which possess constitution, type, and quality.

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

DILLENIA INDICA.

NATURAL ORDER DILLENIACEÆ.

By E. W. BICK, Curator Botanic Gardens.

Derivation.—(B.M. T.5016. 1857.) *Dillenia*, named by Linnæus in honour of John James Dillenius, a former Professor of Botany at Oxford, "because it is of all plants the most distinguished for the beauty of its flower and fruits, like Dillenius amongst botanists" (*Critica Botanica*, p. 80). The specific name *indica* was also given by Linnæus; Thunberg called it *Dillenia speciosa*; following Index Kewensis, it is here given as *Dillenia indica*.

Description.—A good-sized tree, up to 40 ft. in height, with a short, erect, bulky trunk, branches spreading into a broad, rounded head, bark of trunk and larger branches about $\frac{1}{4}$ in. thick, coarse and brittle, internally reddish brown, outer surface grey, shining, rugose, with many small cracks and scales. Leaves very ornamental in appearance, oblong lanceolate, 6 to 12 in. in length, deeply and sharply serrate, with numerous parallel stout ribs, ending in the points of the serratures, coriaceous when old. Petioles 1 to $1\frac{1}{2}$ in. long, channelled.

Flowers.—Large, from 6 to 8 in. in diameter, solitary, borne on slightly curved peduncles, among the terminal leaves, bringing the very large delightfully fragrant flower into an oblique position. Calyx of five, very large, concave, pale green, thick, and fleshy sepals, thin and membranous at the edge, enlarging with the fruit, which they permanently enclose. Petals five, 3 in. long, obovate, cuneate, white, concave in the upper portion, obscurely veined, and slightly waved. Stamens numerous, forming a dense compact mass around pistil, which they entirely conceal except for the stigmas, or, as Roxburgh expresses it, "forming a large yellow globe in the centre, which is elegantly crowned with the white, lanceolate, spreading rays of the stigma." Filaments short, white; anthers linear, yellow; ovaries 15 to 20; ovules minute; styles, as many as ovaries. Fruit compressed, consisting of the numerous subreniform capsules attached to the fleshy central mass that contains a clear glutinous liquid, which surrounds the seeds. The fruit are from 5 to 7 in. in diameter; the fleshy calyx is eaten either raw or cooked by the natives in their curries and chutneys, having an agreeable acid flavour not unlike rhubarb.



PLATE 51.—DILLEENIA INDICA.

Timber.—Sapwood white, heartwood light brown or pinkish, close and smooth grained, hard and tough, used in India for gun stocks and in boat building, and is said to be very durable under water (Brandis Forest Flora, p. 2).

Propagation.—From seed; the seeds are small and somewhat difficult to remove from the fruit, the outer calyx being tough; the young seedlings grow quickly, and the tree thrives best in a moist situation.

A very fine specimen grew in the Acclimatisation Society's grounds at Bowen Park some years ago, from which hundreds of young plants were propagated and distributed, chiefly to Northern Queensland; unfortunately, the old tree at Bowen Park died a year or two ago. A large specimen in the Botanic Gardens was killed by the 1893 flood, but a young tree between the Botanic Museum and kiosk is now flowering freely.

Habitat.—One of the handsomest of Indian trees, whether the beautiful foliage is considered or the size and structure of the flowers. It is largely cultivated by the natives throughout India, particularly about temples. It is indigenous along the base of the Himalayas, from Nepal to Assam, in Bengal, South India, Ceylon, Burmah, and the Malayan Peninsula.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 10.

SOCKET WOOD (*Daphnandra micrantha*).

Common Name.—Socket Wood (the branches when broken at the joints often show a ball-and-socket-like fracture):

Derivation.—Gk. *daphne*, the laurel or bay tree; *aner*, *andros*, a man (probably alluding to the anthers being like those of a daphne); *micrantha* from Gk. *mikros*, small; *anthos*, a flower.

Description.—A large tree, attaining a height of about 120 ft. and a barrel diameter of over 2 ft. Barrel sometimes slightly flanged at the base. Bark grey, often rough with small warts; when cut, yellow with a thin brown outermost layer; thickness of bark, $\frac{1}{2}$ in. on a tree with a barrel diameter of 2 ft. 3 in. Sapwood light yellow. Older leaves and branchlets hairless, young shoots often downy. Leaf stalks $\frac{1}{2}$ to $\frac{3}{4}$ in. long. Leaves opposite, elliptical, rather narrowed at the base, protracted into a fairly long point at the apex, margins coarsely toothed, lateral nerves and net veins more conspicuous on the underside; measurement of leaf blade, 2 to 4 in. long, two and two-thirds to four times as long as broad. Flowers in small bunches (panicles) in the forks of the leaves or at the scars of fallen leaves, the bunches much shorter than the leaves. Stalks of individual flowers short. Individual flowers measuring about $\frac{3}{10}$ in. in diameter when expanded. The outer part of the flower consists of 10 to 15 (11 to 12 in specimens we examined) perianth segments, the outer ones shorter than the inner ones. On the inside of the perianth segments, and shorter than them, are five stamens. On the inside of the stamens are six or more minute hairy staminodia (modified stamens) surrounding several finely hairy bristle-like carpels (female organs). Fruit consisting of the lower part of the perianth enclosing the mature carpels, narrowly egg-shaped or almost cylindrical, often oblique, $\frac{1}{2}$ to 1 in. long; carpels very slender, covered with fine brown hairs attaining $\frac{1}{4}$ in. in length. Flowering period, October; in fruit in January.

Distribution.—Confined to Australia. Common in the scrubs of the Killarney Ranges, National Park, Macpherson Range, Tambourine Mountain. It was also common in the scrubs about Brisbane. Amamoor and Imbil, in the Gympie District, are our northernmost records. As far south as the Hunter River, N.S.W. (J. H. Maiden).

Uses.—The timber could be used for general indoor and cabinet work.

References.—*Daphnandra micrantha*, Bentham, "Flora Australiensis," vol. v., p. 285; F. M. Bailey, "Queensland Flora," part iv., 1295; R. T. Baker, "Hardwoods of Australia," p. 332; J. H. Maiden, "Forest Flora of N.S.W.," vol. vii., p. 368.



Photo. by the Authors]

PLATE 52.—THE SOCKET WOOD (*Daphnandra micrantha*).
Ranges eastward of Emu Vale, Killarney District.



PLATE 53.—THE SOCKET WOOD (*Daphnandra micrantha*).
 A.—Leaf showing underside. B.—Fruits. C.—Seeds.

SUGAR: FIELD REPORTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 6th April, 1922) from the Southern Field Assistant, Mr. J. C. Murray:—

“During March the districts of Gin Gin, Bingera, and Nambour were visited. An inspection was also made of a portion of the country lying between Gympie and Yandina.

“Regarding the Gin Gin areas, the farmers are busy cultivating and planting. The crops look well, especially the 1900 Seedling. Provided the red soil gets an average amount of moisture, in this locality the Mauritius Seedling appears to do particularly well.

“Other canes that are giving the farmers satisfaction include Mahona, Rappoe, Q. 813, Shahjahanpur No. 10, H.Q. 285, and Demerara 1135. Standover cane is suffering slightly from disease, but nothing of a serious nature. No cane that is in any degree young and resistant is in anything but a healthy condition. Careful plant selection should continue to be the farmer's first consideration.

“Grubs are causing some growers more or less serious loss. In such cases the farmers are recommended to plant a resistant variety to this class of attack, such as D. 1135, cultivate often and thoroughly destroy if possible feed trees in the vicinity and experiment with poisons and repellants. The encouraging of birds, such as crows and ibises, is a good idea; the little bandicoot is also a friend of the farmer in this respect. Another factor of importance is to make sure the soil is not deficient in humus. A supply of vegetable matter in the soil diverts the attack from the cane root.

“Noxious weeds are not causing a great deal of trouble, excepting, perhaps, nutgrass, in places.

“It is too early yet to make any definite estimate, but as matters are going, the Gin Gin farmers should have a very fair crop. Rain is wanted, however. At Maroondan, the prospect of a good crop is fairly certain. The farmers have to work hard on these areas to keep a good tilth on their soil, but those who do thoroughly cultivate are generally amply rewarded for their trouble. Canes that are making rapid growth are Black Innis, 1900 Seedling, D. 1135, and D. 156. The farmers in the Maroondan area are particularly free from cane pests and the crops are showing no sign of disease. As frequently mentioned in connection with this place, the greater use of lime is essential, thus improving the texture of the soil, and consequently increasing its fertility. Maize as a rotation crop is to be recommended. Farmers are also urged to go in more for local experiment, which is the most conclusive method of determining the value of fertilising and other operations incidental to successful agriculture.

“Since last visiting the Bingera area there has been a great deal of rain and consequently the farms and plantation are looking very well. More rain will shortly be required, however, as this class of soil, being loose and friable, and having rapid production powers, can consume plenty of moisture.

“Varieties looking best at Bingera and South Kolan include, respectively, N.G. 16, Q. 813, M. 1900, D. 1135, D. 156, H.Q. 285, and Black Innis. Grub attacks are in evidence in places, although there is nothing serious as yet. On the eastern side of Bingera Railway Station farmers are obtaining splendid results, especially from 1900 Seedling. On the red forest loam this cane ratoons well and gives high sugar values. Meatworks fertilisers are principally used, the amounts applied per acre varying to suit the soil requirements. In this particular locality M. 87 and H.Q. 85 are also looking well.

“Oakwood Plantation is now a fine example of subdivision and closer settlement. All the farmers are doing well, and the district is to be congratulated on getting a fine type of settler to take up and farm this land. The cultivation leaves very little to be desired, and considerable experiment is being made with cane varieties and fertilising. Regarding the latter, Mr. Hansen, an Oakwood grower, has done some interesting work in this respect with a mixture containing superphosphate, sulphate of ammonia, nitrate of soda, and sulphate of potash. In all it took about 6 tons of fertiliser to treat 20 acres, and the cost was approximately £120. The method of applying was to place in ratooning furrow by hand on both sides of the stool. Soil analysis was taken as a basis for their operations in conjunction with conclusions previously arrived at by local experiment.

“Varieties making good growth at Oakwood are M. 16804, M. 87, H.Q. 77, Shahjahanpur No. 10, Gingor, D. 1135, 1900 Seedling, N.G. 16, and H.Q. 285.

“The growers are adopting the sensible method of ploughing-in all available vegetable matter.

"In the Nambour district there is a general air of prosperity. Everywhere the fields are green, and land settlement and building are making rapid strides. Sugar-cane production is making satisfactory progress, and it is possible the mill may increase its capacity. Regarding agricultural operations and methods incidental to sugar-cane culture there is nothing of importance to note since last visiting this district. Mr. Story, at Mapleton, has a fine showing of D. 1135 ratoons, and has amply demonstrated that this beautiful district will produce cane as well as other produce. This gentleman, last season, cut a standover plant crop here which averaged him 40 tons per acre with an average c.e.s. value of 12. Other farmers have good crops in this area and should be greatly encouraged to continue planting. On Petrie's Creek and the Maroochy River good progress is being made towards improving the farms. New land is being cleared, drains are being improved, and tramline improvements effected. Drainage is probably the greatest difficulty the farmers have to contend with. Soil conditions still point to the need for lime and green manures. While the land naturally is fertile, the texture of the soil in some cases wants improving, and this can only be accomplished by careful and thorough farming.

"The Maroochy River is a very fine residential as well as farming locality. Few districts possess such possibilities as this place, with its fine waterway and natural beauty. Cane varieties making noticeable headway are H.Q. 285, Q. 813, 1900 Seedling, Black Innis, N.G. 16, and H.Q. 77. All these canes appear to be suitable at present for the Nambour district generally, and H.Q. 285, Q. 813, and 1900 Seedling should be a fine combination of varieties for farmers to plant.

"At Yandina, Mr. Bowder, an enterprising grower, has a fine block of ratoon cane. The varieties are H.Q. 285, Rappoe, Q. 813, and D. 1135. Most of the 70 acres Mr. Bowder has under cane have been put in with a mattock, but it is intended to further clear and plough the plantation.

"There is not a great deal of cane being produced between Gympie and Yandina, but at Eumundi, where there is a lot of fine agricultural land suitable for cane-growing, Mr. Cook, a prominent Eumundi resident, is contemplating planting cane on a larger scale than has hitherto been attempted. The reaction of a soil test taken at Eumundi shows slightly acid. Judging by appearances the humus content of the soil is good and the texture fair. Rappoe and H.Q. 285 are varieties that are growing well, and, if farmers were to seriously consider canegrowing, should do well."

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 4th April, 1922) from the Northern Field Assistant, Mr. E. H. Osborn:—

"*Lower Burdekin Notes (continued).*—Early in the month a couple of days were spent at the Haughton Valley district, under very wet conditions. I was told that during the mill's run of over nineteen weeks 37,035 tons of cane had been crushed, of which 11,917 tons came from Inkerman. Of the total tonnage about 12 per cent. was burnt.

"The average c.e.s., for the season was 14.46 per cent., and some fairly high-density canes were crushed. The highest c.e.s. of the different varieties were:—

H.Q. 426	..	..	..	..	..	17.30	Local cane
Badila	..	..	..	..	..	17.85	Inkerman cane
B. 208	..	..	..	..	..	16.20	Local cane
Q. 855	..	..	..	..	..	15.40	"
Goru 24, 24A	..	..	..	..	..	15.10	"
Goru 24B	..	..	..	..	..	15.30	"
D. 1135	..	..	..	..	..	14.70	"

"At the time of my visit the prospects for the coming season were most encouraging, as the cane (unirrigated) looks very well and some magnificent crops should be harvested during the year, provided, of course, that the climatic conditions continue at all normal.

"Most of the cane was planted in July and August last, and its heavy growth has caused it to fall down in places. The chief varieties noticed were H.Q. 426, B. 208, Badila, N.G. 24, 24A, 24B, Q. 855, Q. 813, Q. 970, Malagache, and M. 1900. In all these varieties some really good cane was seen, 7 and 8 ft. high.

"A very pleasing feature of this district is to notice how well the ratoons thrive, third and fourth being quite usual. At present the farms are fairly scattered and consequently some long haulage is inevitable, but with the advent of the proposed tramway (8 miles in length) conditions for closer settlement will be very much better, and the supply of cane for the mill very much improved.

"The average rainfall for this area varies from 50 to 57 in., the former figure representing the fall taken by Mr. Humphrey, at Giru, and the latter at Mr. W.

Church's, towards the Mountain. So far this year the conditions for a vigorous growth have been ideal, as Giru has had 24.13 in. of rain for January and February. Although this area is comparatively a new one, the growers are fully alive to the value of liming and manuring, and a number of them are either making use of same or intend doing so very soon.

"So far, although grubs are being turned up in ploughing operations, no damage is visible, although, of course, it is very early for such to be apparent.

"*Pioneer Mill*.—Regarding this particular area the cane looks remarkably well, and old growers say that the crops look better at this period of the year than they have done for quite a number of years, and given good growing conditions until crushing time some splendid crops should result. With the bounteous rains experienced early in the year an early start will probably be necessary to handle the large crop expected to be cut for 1922.

"During the season's operations 89,332 tons of cane were crushed, about a-quarter of which was burnt; the average tonnage per acre was 18.7 tons, and the average c.c.s. 14.84 per cent.

"The principal canes grown were the Gorus 24, 24A, 24B, H.Q. 426, Badila, B. 208, Striped Singapore, and in smaller quantities Q. 813, Q. 855, Q. 903, Hybrid No. 1, and Badila Seedling.

"*Inkerman* (comprising Home Hill Area).—Prior to my visit parts of the district had been favoured with showers of 3 and 4 in., whilst at the township itself only about 1.69 in. had fallen up to the end of the first week in March.

"All around the district some very good crops of cane were seen, especially some of the unirrigated farms, considering that up to early in March only 14.25 in. of rain had been registered for the year. Some particularly good 24B was seen on the unirrigated farms of Messrs. Marriott Brothers. In their vicinity, 'up river,' several windmills have been erected since last August, and the appearance of the cane irrigated by their use is very favourable. Another very fine block of Badila was seen on Mr. Mulholland's farm down the river. There are about 38 acres of plant, and some of it shows a very fine growth of cane—large healthy stools with a splendid top.

"There is some fine, deep alluvial soil on this farm, and a portable engine is used for irrigation. Taking the conditions all through the Inkerman cane looks very well, and provided favourable rain comes along to keep the unirrigated blocks in good condition until thoroughly grown, a splendid crop of cane should be harvested for Inkerman this season. Last season Inkerman harvested 128,700 tons of cane; 12,000 of this went to the Houghton, and 8,000 tons to Proserpine. Of this quantity about 50 per cent. was burnt, and the average density of the crop was 14.1 c.c.s.

"*Bowen Cane Areas*.—These areas were visited early in March and found to be looking remarkably well. The rainfall to date had been—January 47.2 in., February 13.28 in., and March 2.82 in., or a total of 20.82 in. These falls have given the cane a real good start, but further showers would help things along very considerably. The number of growers who supplied Proserpine with cane last year amounted to fourteen, but this number is expected to reach thirty-eight for the coming season. Quite a number of other growers are coming in for 1923, and it seems as if a considerable amount of cane will be annually railed to Proserpine from Bowen. The cane grown is mostly in the vicinity of the river, and nearly all of the growers possess small irrigation plants, and as most of the land has a slightly downward grade from the river back, these plants will be able to do the work required.

"*Proserpine Area*.—This district was reached in the middle of March, and it was noticed that owing to too much wet the growers had not been able to do as much work on the land as they would have liked. In numerous places paddocks had had one or two ploughings, but further work had to be postponed. Although the fall had been so constant, yet the total amount was only 27.08 in. to date—i.e., January 3.12 in., February 19.53 in., March 4.43 in., total 27.08 in. Unfortunately, however, for some of the growers situated upon the river banks the rain early in February culminated in a flood overflowing the banks, and causing a fair amount of damage to low-lying adjacent areas. This, of course, will affect the tonnage expected this year to a certain extent.

"About the third week in March a spell of fine hot weather set in, and cultivation was resumed in earnest again. At present a large quantity of ploughing is being carried out, and grubbing operations are to be seen in practically every part of the district.

"Preparation for draining a very large area of land on the Hambledon Plains are also now in hand, and the opening of the line to Mackay will surely enable the mill to tap a further supply of cane land if required.

"Of the newer varieties of cane, Q. 813 with its second place for density, Q. 1121 with fourth, and Q. 903 with sixth, justify their growing on a far larger scale. A good deal of interest is being taken by the farmers' association in the work of the Experiment Station, as two of their members have just returned from a visit to the Mackay Station, and have supplied their association with an interesting account of their experience at Mackay, comprising also a list of the canes that they liked most now growing on the Station.

"In reviewing the district generally, it must be admitted that the cane, both plant and ratoon, is not as far advanced as it should be at this time of the year.

"Owing to too much wet very little early planting was carried out, and the ratoons also did not make the growth that they should from the same cause.

"As regards liming and fertilising, numerous growers speak of using both, and I am inclined to think that large quantities of same will be ordered ere very long, as the successful farmer in this area recognises the value of liming, thoroughly draining, and green manuring."

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Entomologist, Mr. Edmund Jarvis:—

"During the past four weeks 10 in. of rain has fallen here, promoting vigorous growth of the cane. On land where grubs are present, however, excessive wet at this time of year often proves detrimental to autumn planted cane, which, when standing in super-saturated soil of a light character, needs the support of every root to prevent it from being blown over. This applies more particularly to early planted crops of D. 1135, which are at present (25th March) carrying canes 8 to 10 ft. in length. With regard to late planting, it is worth recording that a 10-acre paddock of the above variety planted by Mr. D. McCaul last December—the stools of which are now about 4 ft. high—looks very promising, and is holding up well in light volcanic soil under very wet conditions. This paddock was kept bare during the flying season, so that in all probability the beetles passed it by when ovipositing. It will be instructive to follow up the future development of this plot.

"We were interested also to learn from Mr. McCaul that See Chin, who grew cane successfully at Greenhills in the past, is said to have made use of moth-balls as a deterrent against cane-grubs. It may be well to mention in this connection that during November last, various experiments with naphthalene were carried out by the writer at Meringa Laboratory. Doses of from $\frac{1}{4}$ to 1 scruple were placed in cages holding about 13 cubic inches of moist soil, each enclosing a grub of the 'Small Brown Beetle' (*Lepidiota frenchi*, Black).

"When examined twenty-four hours later, about 65 per cent. of the grubs were on top of the soil, half of them being in a dying condition, while the remainder were found below ground, and apparently normal. At the end of two days (19th November) 35 per cent. were dead, and the remainder either sick or dying. Five days after treatment, when the soil had become more or less flavoured with the odour of naphthalene, all grubs usually succumbed after forty-eight hours. Grubs killed by this fumigant became flaccid, and before decomposing turned a peculiar pinkish-yellow colour.

"Field tests have not yielded satisfactory results. The odour from injections weighing a quarter of an ounce, buried in both heavy and light soils, did not, after a lapse of five weeks, penetrate in either, farther than from 1 to 1½ in.

"Unfortunately, laboratory experiments indicate that grubs of the 'grey-back' cockchafer are less susceptible to the smell of naphthalene than those of *Lepidiota frenchi*. For example, a third-stage grub of the former beetle confined about 2½ in. from an injection was found after an interval of three weeks to be quite unaffected. Our outside tests, however, were made during the wet season. Under dry conditions the soil porosity would, of course, be better, and doubtless the odour would penetrate farther.

"It may be mentioned that naphthalene does not injure cane roots and that the ordinary flaked form was found to be stronger than that sold under the name of moth-balls.

"GRUBS AT GREENHILLS

"This estate was visited on the 20th instant, and although unfortunately the cane on some portions is destroyed or showing unmistakable signs of grub infestation, it was interesting to find that the ravages of this pest had in some measure been controlled by the use of carbon of bisulphide. Owing to the courtesy of the manager, Mr. Hoeicher, and Mr. Flower of the Hambledon Plantation, we were able to note the result of experiments with this fumigant carried out by the C.S.R. Company

last month (February) on block J6. A number of 1-acre plots, treated at rates of from $\frac{1}{2}$ to 1 oz. per stool, are already showing encouraging results. Examination of one of the stools on a control plot which had lost most of its roots and was fast turning yellow, revealed the presence of four grubs of *albohirtum*, (grey-back beetle), three in the second and one in the third stage; while close alongside on a plot treated with $\frac{1}{2}$ oz. per stool the cane showed no signs of injury, was quite green, and possessed an abundance of fibrous feeding-roots.

"With regard to general infestation it may be mentioned that on block N2, near the western boundary of the estate, where the cane is fast turning brown, we found about a dozen grubs under each stool, fully 60 per cent. of which were still in the second stage.

"MANURIAL VALUE OF CANE-BEETLES.

"An analysis of certain samples of beetle-meal, prepared at this Laboratory last January from the dried bodies of 'grey-back' beetles, has been received from our Agricultural Chemist, and on the whole, may be considered as favourable. Mr. Brunnich reports: 'The value as a fertilizer is about £11 per ton, and higher than that quoted for European cockchafer.' A few of the details of this analysis were as follows: Nitrogen, 10.20 per cent.; phosphoric acid, 1.66; potash, 1.75; lime, 0.27; proteins, 63.75; fat, 4.82.

"It will be noticed from the above that this beetle-meal possesses a high food value; but, unfortunately, the sample submitted was found to contain 0.16 per cent. of arsenic. On this account Mr. Brunnich, when referring to the food-value, remarks:—'The use as a food for birds or fowls is doubtful on account of the fairly high amount of arsenic contained in sample. If the arsenic could be eliminated the beetle-meal would be a very valuable fodder.'

"Perhaps in the present instance the arsenic may have been derived from cane-land treated with this poison in hope of destroying the grubs. As much as 200 lb. per acre has been applied on some plantations, and as we know that grubs are continually ingesting soil for sake of the organic matter contained, and it through their bodies, we may, I think, safely infer that in the case of treated soil the arsenic swallowed, although not enough to prove fatal, would tend to gradually accumulate during the larval condition, and be absorbed into the system; and that this would naturally be passed on through the pupa to the beetle. Judging by analysis the arsenic would seem to occur chiefly in the chitinous or horny portions of the outer integuments, such as wing cases, body sclerites, legs, &c., as a sample from which these harder portions had been removed by sifting were found to contain 0.4 per cent. less than that present in the whole-beetle meal.

"A NOTE OF WARNING.

"The above notes, coupled with the fact that growers here are remarking upon the scarcity or total absence during the last eighteen months of ibises and other grub-eating birds, appears significant, and I am of opinion that it would be advisable to discontinue the practice still favoured by some growers of sprinkling large quantities of white arsenic in cane drills; seeing that this has not so far proved effective against the grubs, and may result in the destruction of our useful insectivorous birds. One can understand that if a large bird, like an ibis, for instance, were to fill its stomach with grubs each containing a small proportion of arsenic, it might in this way easily obtain an accumulated dose of poison sufficient to prove fatal.

"PARASITE OF BEETLE-BORER.

"Very shortly, upon commencement of the normal dry season, we intend pushing forward the distribution of tachinid fly parasites, which work has been postponed during the wet, humid conditions experienced here from January to March, which are favourable to spore germination of the entomogenous fungus, *Empusa* sp., a vegetable parasite of tachinid flies.

"It is satisfactory to be able to report that we have now succeeded in establishing these useful parasites in the Gordonvale district. Specimens bred in our laboratory, and liberated at Riverstone last December commenced at once to breed in the field, producing the first brood of flies five weeks later, 22nd January.

"Owing to the interest taken in this work by Mr. G. Alley, the standing cane has been left uncut, and the third brood of flies, which are due to appear from this cane next month (April) will, it is hoped, spread throughout that district, and prevent the borer from doing further serious damage.

"At Mount Sophia flies were released on 6th January, and about eight weeks later when scouting for results, Mr. W. C. Dormer, Assistant Entomologist, found a specimen of the fly among the cane. This, no doubt, was a survivor from the first brood, which had emerged about three weeks earlier, but served to show that the parasites had been breeding there; so possibly those arising from this brood may become established in that locality."

REPORT ON INVESTIGATIONS REGARDING PRICKLY-PEAR CONTROL BY BIOLOGICAL MEANS.

BY PROFESSOR T. HARVEY JOHNSTON, Scientific Controller.

As is well known, the Governments of the Commonwealth, Queensland, and New South Wales have co-operated financially in a scheme of investigations having in view the control of the prickly-pear scourge by means of its natural enemies, such as insects, fungoid organisms, and bacteria. The Commonwealth Prickly-pear Board, which controls the financial side of the work, consists of a representative appointed by each of the Governments concerned, while the whole of the investigational side is in charge of the Scientific Controller.

At a meeting of the Board just held in Brisbane, the writer reported on the present state of the inquiry, and from that report the following information is now being made available to the public, on account of the very encouraging results recorded in it.

In addition to various organisms brought back to Australia from South America, either by the writer or by Mr. W. B. Alexander, one of the members of the staff, four large consignments have been shipped across from the United States (chiefly from Texas, but some from Florida also) by another member of the staff, Mr. J. C. Hamlin, who is still engaged in the United States and the adjacent parts of Mexico, collecting and breeding material for transportation to Australia. Besides, a large number of organisms have been received from that country from time to time through the post. All material received is subject to plant quarantine.

Particular care has been taken to eliminate, by careful breeding, all parasites which might be likely to control the activities of the various organisms proposed to be employed in the biological campaign against the pest. Then, again, systematic experimentation is being conducted with a view to ascertaining, firstly, whether the organisms introduced are effective against all or any of the many kinds of prickly-pear now naturalised in Eastern Australia; and, secondly, whether they are likely to prove inimical to any plants (including fruits) of economic importance. Work along the lines indicated has been carried on for some time in the laboratories of the Prickly-pear Board, the headquarters being at Sherwood, near Brisbane, with a field station near Westwood in Central Queensland.

It is proposed to establish another field station very soon, its location to be in one of the prickly-pear infested districts of New South Wales. The Queensland experiment station was established first because of the more favourable climatic conditions for fungoid and insect development, on account of the warm moist summer.

Eight distinct kinds of fungi, known to cause disease in prickly-pears either in North or in South America, were introduced into the Sherwood laboratory. Of these several have as yet failed to respond to the cultural methods, while of the remainder, only one (*Glæosporium lunatum*) has proved itself to be of any real value. Under certain conditions—namely, combined heat and moisture such as occurs during Queensland summer—this fungus may set up a serious decay of infected pear joints under laboratory experimentation. It has not attacked any other plants experimented with. Until it has been tried out in the field, one cannot state what economic value it has.

A bacterial disease was discovered by the writer while in Florida in 1920, and the organism causing it has been isolated and carefully investigated in the laboratory, where it has proved itself to be capable of causing a very virulent disease amongst all the kinds of prickly-pear naturalised in Queensland and New South Wales. However, as its dissemination appears to depend on inoculation of each joint—a procedure which would be too expensive if human agency were used, on account of labour costs—the services of certain insect enemies of cacti are being tested with a view to utilising them. Of those now under observation at least one has shown itself to be a very efficient transmitter of the disease germ, while a second kind is also capable of carrying it from joint to joint.

Of the many species of insect enemies either brought or sent across from America, several have proved to be of very little value as possible controls, though they are restricted to prickly-pears. Amongst these might be mentioned the various cactus weevils (*Gerstæckeria* spp.), one kind of cactus bug (*Narnia*), and the cactus midges (*Asphondylia*).

Others, such as certain kinds of cochineals (*Coccus* or *Dactylopius* spp.), have been found to prefer certain kinds of prickly-pear. One species at present being cultivated in the laboratory readily attacks the spiny pest pear of the Burnett and Rockhampton districts, but does not normally develop to maturity on the common

pest pear (*Opuntia inermis*), nor on the velvety tree pear (*O. tomentosa*), though it will do so occasionally. This species of insect slowly destroys the affected prickly-pear joints, and though its effects take some time before killing the part to which they have attached themselves, yet their rapid multiplication during warm weather should make them a very useful ally in the work of controlling the pest. Certain Australian ladybird beetles have been found to prey upon and destroy it.

Besides the cactus bug already named, no less than four other species have been introduced. All of them belong to the genus *Chelinidea*. They are more or less gregarious. Their attacks cause the plant to become sickly so that little or no new growth is put forth. Their influence is then not so much destructive but retarding, and to that extent they should greatly help in controlling the pest. They have not, as yet, been found capable of transmitting the bacterial disease.

The cactus longicorn beetles, *Moneilema*, have proved to be very useful enemies of the different pest pears, which they literally eat up, exerting their destructive action both in the larval or grub stage as well as in the adult beetle stage. Unfortunately they breed slowly, and this fact will greatly limit the extent to which they can be utilised in the work. Certain other beetles (*Disonycha*) have been found to be of little or no use against the Australian prickly-pears.

Among the moths, three species stand out, not only on account of their highly destructive effects on the various kinds of pear but also on account of the readiness with which they can transmit the bacterial germs which cause the serious disease referred to earlier in this report. Among the moths are the two kinds of Moth Borers (species of *Melittara*) of which one—the Florida species—has as yet failed to become established, while the other—the Texas species—is doing excellent work, being capable of attacking and destroying all the various kinds of prickly-pear now naturalised in Australia, though apparently preferring the two commonest pest pears. The destructive work is begun as soon as the tiny larva escapes from the egg shell, and is continued for about three months, by the end of which time the full-sized caterpillar, now about two inches long, undergoes pupation, the grey moth emerging about a month later. A considerable amount of time has been spent in breeding up material free from the various parasitic wasps and flies with which some of the consignments were infected, and in controlling a bacterial disease which carried off great numbers in the caterpillar stage.

The other moth is a small yellow insect called *Mimorista*, which in its larval stage very rapidly destroys the young joints of prickly-pear. It is also capable of transmitting the bacterial disease already referred to.

The injuries caused by these three species of moths readily become invaded by scavenging flies. In the United States and South America there are many species which breed especially in decaying cacti, but although large numbers belonging to about half a dozen species (*Stratiomyidæ* and *Syrphidæ*) have been bred out in Brisbane from material received from abroad, yet none has become established here, as the flies have failed to lay eggs. Some small local flies (*Sepsids* and *Drosophilids*) have, however, shown that they will breed readily in rotting prickly-pear and thus aggravate the injuries caused by the other agents, but, as they are small and are not restricted to cacti, their effects are not likely to be as great as those of the true cactus scavenging flies. Further attempts are being made to introduce these desired insects from North America.

It will be seen from the above sketch of the work that the investigations in Queensland show that three groups of organisms stand out prominently, as giving great promise in the biological campaign against the prickly-pear menace—(1) the moth borers (*Melittara*); (2) the *Mimorista* moths, (3) the bacterial disease. The third is apparently dependent for its transmission on either of the former two groups, and though it can be readily propagated in the laboratory, it is of little use distributing it until either of the moth larvæ can be distributed too. Consequently the progress of the work of eradication depends, as far as the investigation shows, on the breeding of the moths. This breeding cannot be unduly forced on, and although a large number is confidently expected to be produced within the next month or two, yet the various species must be bred up in great numbers before any attempt to distribute them broadcast can be made. The public is then asked to refrain from requesting specimens of these prickly-pear destroyers, as none will be distributed until such time as they can be spared, and then the public will be informed through the Press. These insects can be best bred up, at this stage of the work, at one or other of the Board's laboratories.

The information obtained, set forth in brief in the foregoing statement, appears to be of such importance to the States of Queensland and New South Wales, and especially to those whose lands are invaded by the prickly-pear, that the Press of the various Eastern Australian capitals has been invited to assist in making it public.

Judging from the laboratory results, it seems as if there has now been established in Australia a complex of organisms which, provided they act together in the field as they are doing in the laboratory, and provided the moths breed sufficiently rapidly, may ultimately bring about complete control of the prickly-pear menace.

The influence of these biological agents will be at first slow, but as the numbers of insects grow so will the effects increase, and it is hoped that in a few years' time appreciable progress will have been made in those districts in which the organisms will be liberated. Of course, there may be various Australian insects or birds which may develop a liking for the introduced organisms and thus control their activities—*e.g.*, certain kinds of ants have been found to readily attack and destroy the young cactus bugs, and even *Melitara* larvæ during their wanderings, but these are matters which are beyond control in the field.

BANANA BEETLE BORER.

By JOHN L. FROGGATT, B.Sc., Entomologist in Charge of Banana Beetle Borer Investigations.

An insect pest (belonging to the group commonly known as "Weevils") which has forced itself into great prominence amongst banana-growers is the Banana Beetle Borer. The original introduction of this borer into Queensland appears to be shrouded in mystery, but it would seem that on many different occasions when banana plants were introduced from the islands and Jamaica, this pest was brought in with them. By widespread distribution of the imported plants many centres of infestation were formed from which the beetle has spread. At the present time it appears to be scattered throughout a very large part of the banana areas and is still spreading further afield. Even in the last twelve months an appreciable increase in the extent of distribution and amount of damage done has been observed in areas where few or no precautions have been taken. There is no doubt that this pest demands the urgent co-operation of all banana-growers in order to cope with it successfully.

Scientific investigations were begun on the banana beetle borer problem in January, 1921, since when a large amount of work has been done both in the field and in the laboratory, as a result of which much important information has been obtained on the life and habits of the beetle at different periods of the year. Through lack of any published information on systematic research work on the problem, the investigations had to be taken up from the beginning.

The whole of the development of the beetle is passed within the plant, which renders close observation of the different stages extremely difficult and also nullifies the usual methods of treatment for insect pests.

The female beetle when ready to deposit the egg usually selects a site on the plant just about ground level, where the "stem" and the bulb join. She then eats out a small tunnel and, turning round, deposits the egg in the bottom of the tunnel by means of a slender hollow tube projected from the tip of the abdomen. The egg is then lying just underneath the surface of the plant. It is opaque white and about one-twelfth of an inch in length. The egg lies in the tunnel for several days before the larva (or "grub") emerges; this period varies enormously at different times of year, the maximum noted being 35 to 37 days in July, 1921, and the minimum 4 to 5 in January, 1922.

When the grub is ready to emerge, it cuts the egg-envelope by means of its jaws and, working itself free, begins to eat its way into the bulb of the plant. At first the tunnels are very small, but as the grub develops the tunnels become larger. Many grubs may be present in the one plant and in the course of their feeding destroy a considerable amount of the substance of the bulb, which may be called the storehouse of food not only for the plant but also for its product—the bunch of bananas. Where the bulb is badly infested no bunch at all may be formed, or the bunch may be small and the fruit undersized through lack of sufficient nourishment. It is not uncommon in badly infested plantations to find the young suckers small and weedy, again through lack of nourishment from the parent bulb. This is a very serious matter, for the continued prosperity of the plantation depends on the production of strong, healthy suckers.

In most cases the grubs tunnel partially round the outer portion of the bulb, and by this means damage, if not completely sever, the ends of the roots inside the plant; as a result the roots may die back or become weakened and more subject to attack by diseases, and the plant, for want of proper support in the ground, falls out of the stool.



1.—Unflattened specimen, showing convexity of dorsal surface.

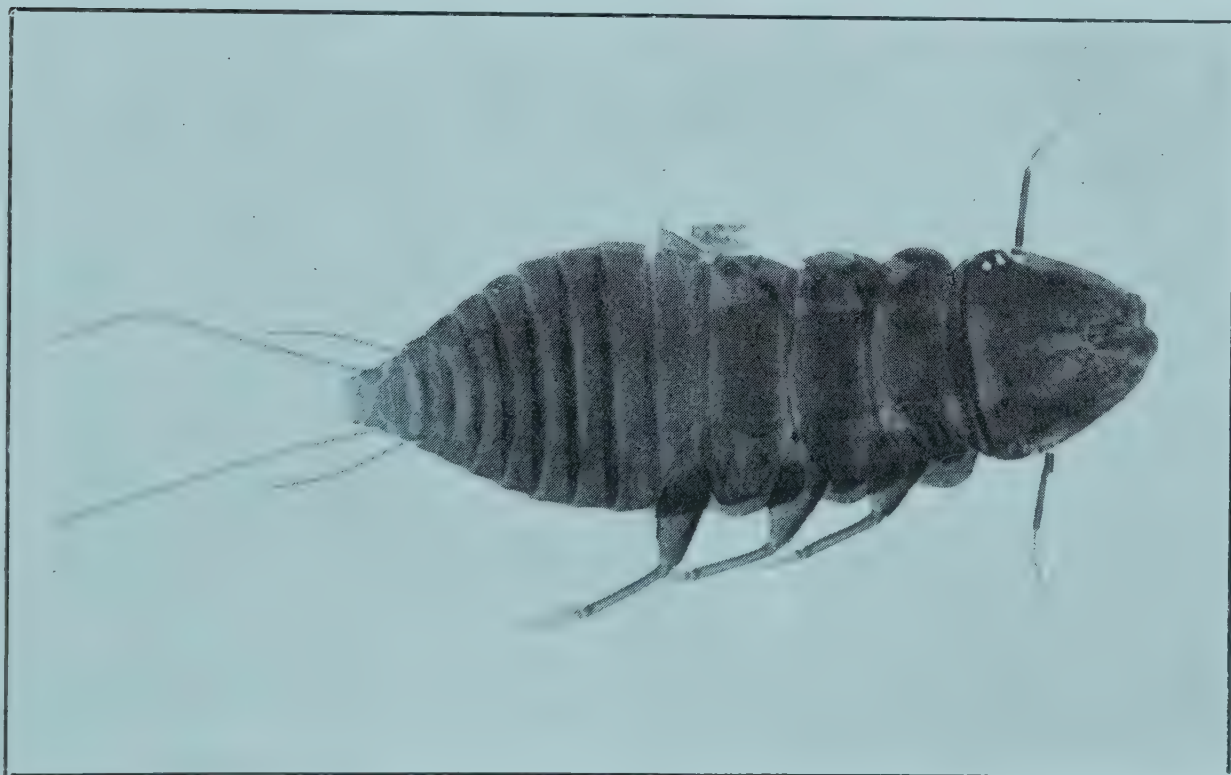


Photo. W. C. Dormer.]

2.—Specimen mounted in balsam (magnified 153 diameters).

PLATE 54.—TRIUNGULIN OF *MACROSIAGON CUCULLATA*, MACL.

When nearing full growth the grub tunnels towards the outer surface of the bulb and in the end of the tunnel turns into the pupa which is nearly always found just underneath the surface of the bulb below ground level. The grub stage occupies 3 to 4 weeks in the warmer portion of the year, but in the colder months this period has been extended to almost 7 weeks. The grub, when full grown, measures a little more than half an inch in length and is white with a very distinct reddish-brown head.

The pupal stage occupies 5 to 7 days in the warmer part of the year, but in the winter it is considerably prolonged. During this stage no movement occurs while the larval structures disappear and the parts of the beetle gradually form. When almost fully developed the pupa changes from creamy to a light yellow or reddish brown, which is the colour of the beetle when it emerges.

After emergence the beetle is comparatively soft, and lies quiet in the pupal chamber for several days, during which time the body becomes harder and the colour darker: that of the mature beetle is black. Before the full colour has been attained, however, the beetle may eat its way out through the plant into the soil. The beetle is a little less than half an inch in length, but specimens are obtained very much smaller than this, due to starvation in the larval stage.

At least a fortnight elapses from the date of emergence of the beetle until the first eggs are laid, but from then on the deposition of eggs is continuous. Variations in egg deposition are marked in the hotter as well as the colder months, being less at these times than in the spring and autumn.

The beetles are found sheltering (and, perhaps, feeding) in the rotting stems and corms, often in numbers.

Experiments have shown that the beetles are most abhorrent of light: though they move *under* the surface of the soil by day they are never found *on* the surface exposed to light. It is thus extremely difficult to follow the movements of the beetles by night. Experiments have been carried out with different-coloured lights to try and find a colour which would not drive them away. So far these tests have proved unsuccessful.

Numerous experiments were carried out, largely in the field, to endeavour to prove whether the beetles flew or not. So far the results have been entirely negative.

Series of tests were made with various oils, &c., to test their efficacy as attractants or deterrents. None of the substances so far tested have any practical value for application in the field.

The life of the beetle is a long one. Of beetles collected in January, 1921, and fed on banana corm, the last died at the end of March, 1922; in other cases of beetles bred in the laboratory and collected in the field during last year, a large number are still alive.

A long series of tests are at present being carried out on poisoning, which, from laboratory results, appear favourable as a means of destroying the beetles. If the laboratory results prove satisfactory, field tests will be instituted to prove its value under practical conditions.

The only means of control that are at present practicable are to dig out and destroy infested material and lay "corm baits" to "trap" the beetles. To make these baits, split a banana bulb into several pieces and lay each piece with a cut surface flat on the ground in or alongside the infested stool; examine these "baits" once a day (the morning for preference), and destroy the beetles found underneath them. Careful attention must be paid to the stems lying on the ground, as these are also liable to be breeding-grounds for the beetle borer. If chopped into small pieces, though eggs be laid in them, the grubs will not be able to mature for want of sufficient food, and the stems will rot or dry up much faster than if left whole.

Of natural enemies there is very little evidence. On three occasions a predaceous beetle grub has been found which attacks the grubs and the beetle of the banana borer, but so far there is no satisfactory evidence of this grub ever acting as a check on the development of the banana borer.

In October, 1921, a small consignment of a predaceous beetle, an enemy of the banana beetle borer, was received from Java, and liberated at once in a small area when infestation was bad in the bananas. So far it has not been recovered; but, as Jepson records that the developmental period is a long one (Bulletin 7, Dept. of Agric., Fiji), it must not be taken for granted that this beetle has died out.

NORTHERN EXPERIMENTS—1921-1922.**POTATOES IN COMPARATIVE TRIAL—TOLGA.**

By N. A. R. POLLOCK, Northern Instructor in Agriculture.

FARM OF W. S. ALLEN, TOLGA.

Forest land; broken up, 1920.

Crop of cowpeas for seed, harvested May, 1921.

Land ploughed 7 in. deep—June, 1921.

Land ploughed 7 in. deep—September, 1921.

Drills 4 ft. 3 in. apart, 18 in. between sets.

Planted 13th September.

Good rains fell in October, but, November and half December being without rain, the plants received a severe check, but responded excellently to the rains when they fell in late December.

Harvested 6th and 7th March, 1922.

Results—

						Per Acre (saleable).	
						Tons.	Cwt.
Up-to-date	..	..	..	..	..	4	15
Brownell Beauty	..	..	..	..	..	4	0
Plunket	..	..	..	..	..	4	7
Carmen	..	..	..	..	..	3	15
Beauty of Hebron	..	..	..	..	..	3	10
Victory	..	..	..	..	..	3	5
Early Rose	..	..	..	..	..	2	5
Manistee	..	..	..	..	..	1	13

Remarks.

Up-to-date maintains its superiority in yield. Every root dug well, second growth being almost entirely absent and percentage of "smalls" very low.

Plunket.—A poor strike resulted from the seed, but the potatoes came true to type; last season the resultant potatoes would not be recognised as Plunkets. Plants yielded consistently and, as with the coastal lands, this variety can be recommended.

Brownell Beauty.—Yielded well, but badly subject to second growth, many of the tubers being ill-shaped and unsaleable.

Carmen.—An old favourite in the district, yielding nicely-shaped attractive tubers, and a consistent fair cropper.

Beauty of Hebron.—During the growing season this variety promised to eclipse all others: it flowered first, and when the rains came made a heavy growth of top and produced some very good tubers. Had the season been good it should have yielded heavily. Certainly worthy of more extended trial.

Victory.—This potato in appearance, growth, and length of season is very similar to *Up-to-date*. The proportion of saleable potatoes was the best of the trial. Worthy of further trial.

Early Rose.—Being an early sort, this variety, like *Beauty of Hebron*, probably suffered more from the dry weather. Tubers were small and trial disappointing.

Manistee.—Only a 50 per cent. strike occurred, and the variety did not appear thrifty at any stage of growth. In the scrub soils late plantings in February and March with this variety are more successful. Cannot recommend it for main-crop plantings.

Coronation.—Seed was very mixed, and appeared more like Brownells. The variety is understood to be a blue potato similar to *Guyra Blue* or *Commonwealth*. No record of yield made.

Manhattan.—Owing to unsound seed only a few roots matured, but these yielded well, and the variety is worthy of further trial.

On the whole, considering the season experienced, which is unique in the history of the Tableland—heavy rains in October followed by six or eight weeks' dry weather—the results are distinctly good. Had the rains, as is usual, followed on the first heavy fall, the result would have been much heavier and the early maturing sorts would have turned out better, especially *Beauty of Hebron*, which, with *Manhattan*, stands more heat than other varieties.

SHOW DATES, 1922.

Show society secretaries are invited to forward for insertion in this list dates of forthcoming shows. Alterations of dates should be notified without delay.

Longreach: 2nd and 3rd May.
 Wondai: 3rd and 4th May.
 Charleville: 3rd, 4th, and 5th May.
 Toogoolawah: 4th and 5th May.
 Grafton: 3rd to 6th May.
 Blackall: 9th and 10th May.
 Miriam Vale: 9th and 10th May.
 Mitchell: 10th and 11th May.
 Boonah: 10th and 11th May.
 Murgon: 10th and 11th May.
 Roma: 16th and 17th May.
 Emerald: 17th and 18th May.
 Kilkivan: 17th and 18th May.
 Ipswich: 17th and 18th May.
 Wallumbilla: 23rd and 24th May.
 Maryborough: 23rd to 26th May.
 Hughenden: 23rd and 24th May.
 Springsure: 24th and 25th May.
 Lowood: 25th and 26th May.
 Childers and Beaudesert: 30th and 31st May.

Bundaberg: 1st to 3rd June.
 Marburg: 2nd and 3rd June.
 Brookfield: 3rd June.
 Cairns: 7th and 8th June.
 Gin Gin: 7th and 8th June.
 Woombye N.C.A.H.S.: 7th and 8th June.
 Mount Larcom: 9th and 10th June.
 Gladstone: 15th and 16th June.
 Rockhampton: 22nd, 23rd, and 24th June.
 Esk: 28th and 29th June.
 Mundubbera: 29th and 30th June.

Mackay: 30th June and 1st July.
 Gayndah: 4th, 5th, and 6th July.

Nambour: 5th and 6th July.
 Townsville: 5th and 6th July.
 Charters Towers: 12th and 13th July.
 Gatton: 12th and 13th July.
 Proserpine: 13th, 14th, and 15th July.
 Rosewood: 19th and 20th July.
 Caboolture: 20th and 21st July.
 Mount Gravatt: 22nd July.
 Barcaldine: 25th and 26th July.
 Crow's Nest: 26th July.
 Pine Rivers: 28th and 29th July.
 Wellington Point: 29th July.

Sandgate: 4th and 5th August.
 Royal National: 7th to 12th August.
 Belmont: 19th August.
 Murrumbidgee: 22nd to 24th August.
 Coorparoo: 26th August.
 Kenilworth: 31st August.

Beenleigh: 1st and 2nd September.
 Zillmere: 1st and 2nd September.
 Gympie: 7th, 8th, and 9th September.
 Wynnum: 9th September.
 Imbil: 13th and 14th September.
 Laidley: 13th and 14th September.
 Sherwood: 16th September.
 Rocklea: 23rd September.
 Kileoy: 28th and 29th September.

Esk Camp Drafting: 4th and 5th October.
 Pomona: 4th and 5th October.
 Southport: 6th October.
 Enoggera: 7th October.

DAIRYING INDUSTRY.

BOARD MEETING, 6TH APRIL, 1922.

A large number of important matters were dealt with by the Advisory Board, and amongst those coming before the Board for consideration were:—

The Board has received notification from the Railway Department that their request for a 20 per cent. reduction in rail freights on dairy products in their manufactured state to market has been complied with, and that same would operate as from the 3rd April, 1922.

In view of the injury in transit and the consequent depreciation of cheese sent loose by rail to Brisbane, it was recommended by the Board that all cheese for export should be crated at the factories and consigned therefrom direct to the cold stores; this recommendation to come into operation from the commencement of the next export season.

The Board has decided to interview the Commissioner for Railways and discuss with him matters pertaining to better facilities for transport, &c., of dairy products to factories.

The Board realises the importance and need for the introduction of a standardised system of bookkeeping and costing system in factories so that the management of same may be conducted upon the most economical lines, and intend to urge the adoption of such a scheme as soon as possible.

A recommendation was made to the Minister for Agriculture in connection with railway charges on bacon factory products carried by rail from the factory to the market.

DAIRYING INDUSTRY ADVISORY BOARD.



PLATE 55.—Standing (Left to Right)—T. FLOOD PLUNKETT, W. PURCELL, H. KEEFER.
Sitting (Left to Right)—J. E. DEAN, W. T. HARRIS, E. GRAHAM (Chairman), G. BURTON, W. H. FRANKLIN (Secretary).

FRUIT FLY INVESTIGATIONS.

[FIRST PROGRESS REPORT.]

BY HUBERT JARVIS, Entomologist in charge of Fruit Fly Investigations at Stanthorpe.

Early in February Mr. Hubert Jarvis, of the Division of Entomology, Department of Agriculture and Stock, was appointed to investigate the fruit-fly problem in the Granite Belt. The following report of his observations and activities covers the period from 12th February to 12th March, 1922, and is made available for publication by the Minister for Agriculture and Stock (the Hon. W. N. Gillies, M.L.A.):—

The greater part of the time embraced in the following report has been spent interviewing orchardists and inspecting orchards, travelling, and making arrangements for and establishing the office in Stanthorpe.

The following sub-districts have been visited:—

Dalveen, Cottonvale, Thulimba, Summit, Applethorpe, Stanthorpe, Beverley, Broadwater, Glen Aplin, Eukey, and Ballandean.

In all these areas the Queensland fruit fly (*Dacus Tryoni*) was found to be present in one or more of its phases.

It appears with the earliest fruit, and disappears with the latest, thus being active for a period of about six months.

The following fruits have been examined and found to harbour fruit fly larvæ or maggots:—

Stone Fruits—Peach (var. Comet) and Nectarine.

Pommaceous Fruits—Apple, var. Jonathan, Five Crown, Munro Favourite, Granny Smith, Gravenstein, Delicious, Lady Hopetoun. Pear—Beurre Box and one other.

Other fruits—those of earlier production—said to be attacked are Prune, Plum (all varieties), Cherry Plum, Cherry, and Fig.

No wild fruits suitable for the development of the fruit fly (*D. Tryoni*) have yet been met with in the Granite Belt.

THE EGG OVIPOSITION.

The eggs of the fruit fly have been found in the following fruits:—

Apples: Five Crown, Jonathan, Gravenstein.

Peach: var. Comet.

Oviposition appears to be continuous, varying stages of maggot growth having been found in single fruits, the eggs also being present.

The eggs are laid side by side in a cavity made by the ovipositor (egg-layer) just beneath the skin of the fruit. The ovipositor, when in use, protrudes beyond the end of the body of the female, and can, therefore, easily be seen with the naked eye.

The number of eggs laid in individual punctures (in fruit examined) varied from four to eight. The fly usually chooses a spot on the sunny side of the fruit, or on any swelling likely to ripen and sweeten early. In the peach, the first attack is almost invariably on one of the ridges or cheeks of the fruit. The fruit fly appears to be attracted by the aroma of ripening fruit. Thus, fruit situated on the outside of the tree, and that matures earlier than fruit deeply sheltered, is in consequence more badly attacked by the fly.

It has been observed that the suitability or otherwise of the medium (tissue) in which the eggs are deposited is a governing factor in hastening or retarding the hatching of same. Thus, with eggs laid in hard, immature apples, this is delayed and they often perish, with the result also that the surface of the fruit has a pitted appearance, owing to the tissue surrounding the puncture growing outwards and leaving the mark or sting in the centre. These marks are locally known as "dead stings."

As many as thirty punctures have been found in one fruit (Five Crown apple), and as few as one only.

THE MAGGOT.

The maggot when hatched in the peach usually works inward to the centre, there obtaining probably the maximum amount of heat and moisture—two conditions favourable to its rapid development.

In the apple, on the other hand, the maggot appears to keep fairly near the surface until about half-grown, when it works inward, being at that stage more able to break down the tissue and create those conditions desirable for its growth.

As many as forty maggots have been found in one peach (eggs also being present), and seldom fewer than fifteen maggots (thus showing the importance of collecting all infested fruit and destroying same).

The number of maggots is, however, by no means in correspondence with the number of punctures.

Eggs may perish owing to unsuitability of tissue or fungus-disease; and flies are often accidentally disturbed while boring the fruit before they have time to lay their eggs.

THE PUPA.

The pupa has been found in the soil (under trees carrying fruit) at varying depths, from $\frac{1}{2}$ in. to 3 in.—i.e., 2 to 3 in. in clean or clear ground, and $\frac{1}{2}$ in. to 1 in. in ground covered with weeds and grass.

The pupa has, too, been found within the fruit (apple) and also slightly projecting from same. A search has been made for pupæ under trees, the crops of which, with a history of maggot-infestation, have been some weeks gathered, the soil being sifted to a depth of 1 ft., with, however, negative results.

THE ADULT FLY.

The fruit fly (*Dacus Tryoni*) has on several warm, sunny days been observed on the wing, and also ovipositing in peaches at Dalveen, the Summit, and Eukey, but nowhere in any numbers, probably owing to the lateness of the season. The specimens observed were shy and restless and very easily disturbed.

OTHER FRUIT FLIES.

One specimen only of *D. Tryoni*, var. *solani* (H.T. MSS.) male has been met with. This specimen was caught in a "Magnet" trap with "Magnet" lure, at Mr. D. Stephen's orchard at Dalveen; this trap, according to Mr. Stephen's testimony, had been set for about two months, and had not, during this period, been examined. (The scent of the lure was still quite strong, however.)

WORK IN HAND.

A collection is being formed, embodying all stages of development of the fruit fly, for reference and for experimental work.

Steps are being taken to secure, by breeding, a large stock of pupæ and adult flies; this material is required for investigation.

Projected experiments are along the following lines:—

To ascertain—

- (1) The depth to which the maggot will penetrate into the soil.
- (2) The longevity of the adult fly.
- (3) The duration of the pupal stage during the winter months.
- (4) The possibility of breeding the fly during the winter.
- (5) In which stage or phase of its development, and where, the fly winters.

CONTROL MEASURES.

Natural Enemies.

Two species of ground beetles (Carabidæ) have been found plentifully under infested fruit and leaves; and are, doubtless, doing useful work as predators.

The Fruit Fly Parasite (*Opius Tryoni*, Cam., Braconidæ) has so far not been met with.

CONCLUDING REMARKS.

At present the only practical means of control is in cleaning up all infested fruit, both on the ground and on the trees, and boiling, burying, or burning same. Boiling is, however, by far the safest and best means of destruction. Burying (if 18 in. deep, and the ground pressed hard) should prove fatal to the maggots and pupæ; experiments projected will indicate the correct procedure in this respect. The method of destruction by drowning will also be tested; but there are already grounds for concluding that, on the fruit being put into a large tub or barrel and covered with water, any maggots harbouring in it would be destroyed.

Trapping by Means of Lures.

Some measure of success has apparently been achieved in this direction by Mr. A. Hall, of the Summit. He has, I believe, succeeded in trapping both the male and female of the Queensland Fruit Fly (*Dacus Tryoni*). Flies submitted to me by him, as so trapped, I have identified as of this species; about 25 per cent. of the number submitted (80) were male flies, and the remainder females.

I have seen (in the field) one Fruit Fly (*D. Tryoni*) female enter Mr. Hall's trap (baited with this "new lure") and get caught; but I have not as yet had an opportunity to observe its action or test it further.

OTHER FRUITS AND VEGETABLES, &C.

Fly maggots, closely resembling in habits and structure the maggot of the Fruit Fly (*D. Tryoni*), have been found by me in Tomato. These maggots are being bred-out in the office, and may probably prove to be the maggot stage of the Tomato Fly (*Lonchca splendida*).

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1922 AND 1921, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Mar.	No. of Years' Records.	Mar., 1922.	Mar., 1921.		Mar.	No. of Years' Records.	Mar., 1922.	Mar., 1921.
<i>North Coast.</i>	In.		In.	In.	<i>South Coast—continued:</i>	In.		In.	In.
Atherton ...	9.11	21	5.91	26.25	Nambour ...	9.85	26	0.92	13.70
Cairns ...	18.21	40	11.24	32.21	Nanango ...	3.44	40	0.60	6.28
Cardwell ...	16.41	50	9.06	18.38	Rockhampton ...	5.07	35	1.59	3.84
Cooktown ...	14.99	46	19.55	25.48	Woodford ...	8.32	35	1.39	12.16
Herberton ...	8.41	35	5.91	21.13					
Ingham ...	16.25	30	11.14	15.26	<i>Darling Downs.</i>				
Innisfail ...	26.11	41	15.74	62.62	Dalby ...	2.77	52	0.48	1.18
Mossman ...	18.84	14	23.08	32.78	Emu Vale ...	2.69	26	0.90	0.61
Townsville ...	7.89	51	1.34	2.93	Jimbour ...	2.66	34	1.57	2.15
					Miles ...	2.78	37	0.85	2.10
<i>Central Coast.</i>					Stanthorpe ...	2.80	49	1.20	1.77
Ayr ...	7.37	35	1.01	6.48	Toowoomba ...	3.95	50	0.94	5.15
Bowen ...	5.99	51	2.11	11.71	Warwick ...	2.70	57	0.22	0.82
Charters Towers ...	3.66	40	8.12	5.44					
Mackay ...	12.62	51	2.15	28.58	<i>Maranoa.</i>				
Proserpine ...	12.73	19	4.33	26.87	Roma ...	2.86	48	0.55	3.01
St. Lawrence ...	6.07	51	0.15	4.50					
<i>South Coast.</i>					<i>State Farms, &c.</i>				
Biggenden ...	4.32	23	0.65	4.08	Bungewongorai ...	1.81	8	0.26	2.78
Bundaberg ...	5.55	39	1.07	3.31	Gatton College ...	3.55	23	0.03	3.64
Brisbane ...	5.84	71	2.01	7.86	Gindie ...	2.89	23	0.80	1.06
Childers ...	5.19	27	0.54	4.45	Hermitage ...	2.64	16	0.36	6.29
Crohamhurst ...	11.67	30	2.17	14.09	Kairi ...	7.99	8	7.15	31.17
Esk ...	4.94	35	0.98	5.44	Sugar Experiment Station, Mackay	11.93	25	1.59	26.31
Gayndah ...	3.31	51	1.53	4.29	Warren ...	2.96	8	1.01	2.11
Gympie ...	6.34	52	2.01	6.73					
Glasshouse M'tains	9.79	14	1.54	14.60					
Kilkivan ...	4.08	43	1.87	4.70					
Maryborough ...	6.41	51	0.80	5.10					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

THE 1922 SUGAR CROP.

The General Superintendent of the Bureau of Sugar Experiment Stations states that a rough preliminary estimate of the 1922 Queensland sugar crop places the figure at present at about 290,000 tons. The yield was expected to be higher than this, but the recent dry weather at Bundaberg and Mackay has reduced the expected tonnage to some extent. Whether the above figure will be realised depends on a continuance of favourable weather, which would mean more rain in the Bundaberg and Mackay districts. The cyclone and flood season should now be over, but there is still the frost menace in the Southern districts to be considered. The above output will be in excess of last year's figures (281,000) and also of the present consumption.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MARCH, 1922.

The laying for the concluding month of the 1921-22 competition was very inferior. This can be attributed to an unavoidable change in feed. Heavy moulting was prevalent in nearly every pen. The following identification rings were placed on the birds competing in the single tests:—Light breeds—"A," white band; "B," red; "C," blue; "D," green; "E," pink; "F," yellow. The heavy breeds are the same, with the exception of "A" bird, which has a black ring instead of a white. The fresh birds competing in the 1922-23 test are placed in pens as follows:—"A," white band; "B," red; "C," blue; "D," green; "E," pink; "F," yellow. The returned birds which laid 200 2-oz. eggs, or over, in single tests, have a sealed band on leg with number of eggs laid in 360 days. The scores for the month are for thirty days, all birds being returned on 31st March. The following are the individual records:—

Competitors.	Breed.	Mar.	Total.
LIGHT BREEDS.			
*J. M. Manson	White Leghorns ..	71	1,519
*W. and G. W. Hindes	Do.	76	1,509
*T. Fanning	Do.	84	1,479
*Mrs. R. Hodge	Do.	80	1,471
*H. Fraser	Do.	81	1,431
R. Gill	Do.	70	1,384
Oakleigh Poultry Farm	Do.	97	1,368
*C. M. Pickering	Do.	57	1,321
F. Birchall	Do.	74	1,319
*Geo. Trapp	Do.	58	1,317
R. C. Cole	Do.	97	1,301
W. A. Wilson	Do.	96	1,297
Mrs. E. White	Do.	88	1,286
*H. C. Towers	Do.	87	1,277
*W. Becker	Do.	51	1,276
*Thos. Taylor	Do.	49	1,258
Bathurst Poultry Farm	Do.	84	1,245
H. C. Thomas	Do.	53	1,244
*Thos. Eyre	Do.	48	1,243
*C. Goos	Do.	38	1,242
*S. L. Grenier	Do.	42	1,232
*R. C. J. Turner	Do.	29	1,229
*E. A. Smith	Do.	65	1,226
*E. Chester	Do.	56	1,223
*G. Williams	Do.	61	1,221
*Mrs. L. Anderson	Do.	48	1,121
*J. W. Newton	Do.	41	1,194
J. W. Short	Do.	52	1,193
M. F. Newberry	Do.	56	1,192
H. Stacey	Do.	66	1,187
*B. Chester	Do.	55	1,174
W. Barron	Do.	61	1,172
*H. P. Clarke	Do.	40	1,162
*Haden Poultry Farm	Do.	34	1,154
Linquenda Poultry Farm	Do.	75	1,124
O. C. Goos	Do.	58	1,119
Mrs. E. Z. Cutcliffe	Do.	53	1,084
E. Stephenson	Do.	51	1,067
*W. and G. W. Hindes	Brown Leghorn ..	56	1,028
Brampton Poultry Farm	White Leghorns ..	49	1,022
W. N. Glover	Do.	35	1,009

EGG-LAYING COMPETITION—*continued.*

Competitors.					Breed.	Mar.	Total.
HEAVY BREEDS.							
T. Fanning	...	...	...	...	Black Orpingtons	91	1,487
W. Becker	...	...	...	...	Langshans	105	1,457
*R. Burns	...	...	...	...	Black Orpingtons	62	1,424
*T. Hindley	...	...	...	...	Do.	78	1,406
*A. E. Walters	...	...	...	...	Do.	72	1,384
*Parisian Poultry Farm	...	...	...	...	Do.	78	1,372
*C. C. Dennis	...	...	...	...	Do.	75	1,350
*J. Ferguson	...	...	...	...	Chinese Langshans	65	1,311
G. Muir	...	...	...	...	Black Orpingtons	95	1,310
Jas. Ryan	...	...	...	...	Rhode Island Reds	82	1,309
*E. Morris	...	...	...	...	Black Orpingtons	76	1,302
Rev. A. McAllister	...	...	...	...	Do.	57	1,264
*J. Cornwell	...	...	...	...	Do.	76	1,246
*E. F. Dennis	...	...	...	...	Do.	56	1,234
Jas. Every	...	...	...	...	Langshans	79	1,220
Jas. Potter	...	...	...	...	Black Orpingtons	92	1,218
*N. A. Singer	...	...	...	...	Do.	50	1,211
*J. E. Smith	...	...	...	...	Do.	79	1,196
*H. M. Chaille	...	...	...	...	Do.	82	1,166
*R. Holmes	...	...	...	...	Do.	65	1,159
*E. Oakes	...	...	...	...	Do.	58	1,156
*E. Stephenson	...	...	...	...	Do.	74	1,147
G. Cumming	...	...	...	...	Do.	63	1,138
*A. Shanks	...	...	...	...	Do.	57	1,131
*Mrs. G. Kettle	...	...	...	...	Do.	45	1,126
J. W. Newton	...	...	...	...	Do.	46	1,059
F. Harrington	...	...	...	...	Rhode Island Reds	74	1,056
T. C. Hart	...	...	...	...	Black Orpingtons	63	996
Total	...	...	...	...	...	4,517	85,855

* Indicates that the pen is engaged in single test.

DETAILS OF SINGLE TEST PENS.

Competitors.				A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.										
J. M. Manson	..	..	..	248	247	292	241	293	198	1,519
W. and G. W. Hindes (W.L.)	..	..	..	268	240	256	270	242	233	1,509
T. Fanning	..	..	..	256	241	282	230	225	245	1,479
Mrs. R. Hodge	..	..	..	248	242	267	256	258	200	1,471
H. Fraser	..	..	..	285	210	261	253	228	195	1,431
C. M. Pickering	..	..	..	244	235	239	198	211	194	1,321
Geo. Trapp	..	..	..	244	200	233	206	235	199	1,317
H. C. Towers	..	..	..	221	201	226	181	203	245	1,277
W. Becker	..	..	..	248	236	199	198	217	178	1,276
Thos. Taylor	..	..	..	223	205	207	178	188	257	1,258
Thos. Eyre	..	..	..	224	193	170	207	242	207	1,243
C. Goos	..	..	..	217	228	185	155	180	277	1,242
S. L. Grenier	..	..	..	194	237	178	212	210	201	1,232
R. C. J. Turner	..	..	..	205	202	204	211	192	215	1,229
E. A. Smith	..	..	..	257	165	232	216	196	160	1,226
E. Chester	..	..	..	241	188	197	191	193	213	1,223
G. Williams	..	..	..	269	223	177	169	206	177	1,221
Mr. L. Anderson	..	..	..	217	219	181	199	220	185	1,221
J. W. Newton	..	..	..	209	228	250	194	134	179	1,194
B. Chester	..	..	..	173	183	213	198	213	194	1,174
H. P. Clarke	..	..	..	240	151	203	161	224	183	1,162
Haden Poultry Farm	..	..	..	144	198	214	210	194	195	1,154
W. and G. W. Hindes (B.L.)	..	..	..	163	174	164	117	158	252	1,028

DETAILS OF SINGLE TEST PENS—*continued*.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	188	205	302	214	244	271	1,424
T. Hindley	246	247	265	183	215	250	1,406
A. E. Walters	282	228	223	210	220	221	1,384
Parisian Poultry Farm	243	226	218	312	165	208	1,372
C. C. Dennis	220	197	208	253	244	228	1,350
J. Ferguson	216	209	224	254	218	190	1,311
E. Morris	246	213	163	246	214	220	1,302
J. Cornwell	174	226	206	234	187	219	1,246
E. F. Dennis	208	218	199	187	204	218	1,234
N. A. Singer	221	205	182	211	172	220	1,211
J. E. Smith	267	284	185	133	166	161	1,196
H. M. Chaille	153	216	209	239	186	163	1,166
R. Holmes	167	209	197	205	213	168	1,159
E. Oakes	201	190	198	215	172	180	1,156
E. Stephenson	233	190	210	210	147	157	1,147
A. Shanks	162	190	191	200	166	222	1,131
Mrs. G. Kettle	184	223	248	112	170	189	1,126

CUTHBERT POTTS,
Principal.

General Notes.

PUBLICATION RECEIVED.

The "Dairyman's Calendar," compiled by Lever Bros., Ltd., Melbourne and Sydney, a booklet which should prove a considerable help in the business of Dairy Farming, dealing, as it does, with the feeding and general treatment of dairy cattle for each month in the year, as well as of their particular ailments, injuries, &c.

The booklet is obtainable "post free," Sunlight Works, Sydney.

PRICE OF CHAFF BAGS AND WOOL BALES.

Cotton growers are informed that the State Produce Agency, Turbot street, Brisbane, can supply chaff bags at 6½d. each, and wool bales at 3s. each, suitable for cotton intended for transport.

TOWERS PASTORAL, AGRICULTURAL, AND MINING ASSOCIATION.

The committee have changed the dates for holding the Association's Annual Show, from Wednesday and Thursday, 12th and 13th, to Tuesday and Wednesday, 11th and 12th July, 1922.

Answers to Correspondents.

SUN-DRYING OF BANANAS.

C. B. SUTTON, Novar, Bilambil, Tweed Heads—

In reply to your query of even date regarding sun-drying of bananas, Mr. A. H. Benson, Director of Fruit Culture, writes:—"This is a very simple matter. The fruit should be allowed to become thoroughly ripe, the skin should then be removed and the fruit placed on wooden trays 3 ft. long and 2 ft. wide, made by nailing four pieces of timber 6 in. wide and 3 ft. long to a cleat at each end, the cleats to be 2 in. by 1 in. The trays are then exposed to the direct rays of the sun, and when the fruit is dry on the one side it should be turned over so as to dry the other side. The fruit—when sufficiently dried which is known by its consistency, that is to say, there must be no moisture—is then placed in a sweat box to even up. The sweat box consists of a light case of any desired size in which the fruit is placed loosely. Whilst in the sweat box the fruit which is over dried absorbs the moisture from the fruit that is under dried and the sample then becomes of even quality. After the fruit is removed from the sweat box it should be placed in a wire bucket and dipped for about five seconds into boiling water, this is to kill any eggs that may have been laid by moths or other insects on the fruit during the process of drying or sweating. After dipping the fruit is placed on the trays which are put out in the sun and fruit thus rapidly dried. It is then ready to pack. The finished product should be packed in any size boxes that are desired, the boxes should be lined with clean paper and the fruit evenly and firmly packed."

PAPER MULCH FOR PINEAPPLE-GROWING.

A Nambour correspondent asks for further information on the use of paper as a mulch for pineapples, which appeared in the "Agricultural Gazette of New South Wales" for March last, and which we republished in the March issue of this Journal. As we have no details of the kind of paper used for the purpose, nor of its preparation, if any, for exposure to the weather, our correspondent might obtain further information by writing to the editor of the N.S. Wales Journal, Sydney.

TANNING RABBIT SKINS.

B. SCHNEIDER, Box 54, P.O., Stanthorpe—

Boil some wattle bark until it is of a thick, pasty consistence. Add enough water to make it the shade of brown required. Place the skins in this tan liquid, with the fur side of one resting on the skin side of the next, in layers, until all are covered. Leave them in the liquor for a fortnight or twenty-one days—the longer period for preference. Then take them out and peg them on a board, as when first dried. Leave them until thoroughly dry, and they will be fit for whatever use you may put them to. The skins should be of a good brown colour.

TO GET RID OF BLACK ANTS.

W. BILLINGTON, Warra—

(1) Try sprinkling shelves, &c., with oil of pennyroyal. (2) Wash with carbolic soap. (3) Dissolve a piece of ammonia the size of a hen's egg in one quart of water and brush the shelves with it. (4) Pour gasoline into their mounds (if outside) and set fire to it. (5) Lay carpet rag strings soaked in corrosive sublimate in their tracks. (6) Make the following mixture:—White lime slaked, 6 quarts; kerosene oil, $\frac{1}{2}$ pint; turpentine, 1 wine glass; soft soap, 5 lb.; cowdung, 3 quarts; water, 16 quarts. This latter is suitable for washing fruit trees. None of these remedies is permanent, but will require repeating often.

COAL ASHES FOR THE SOIL.

W. BROWNE, Palmwoods—

Mr. J. C. Brünnich, agricultural chemist, in reply to your letter, advises that coal ashes have practically no manurial value. The application of coal ashes may help to loosen stiff soils, but, on red sandy loam, it may do some harm.

Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but obviously this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola-nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems.

Cotton crops are now fast approaching the final stages of harvesting. Growers are advised that all cotton in the Central District should be consigned to the Australian Cotton-growing Association, Rockhampton; whilst those in the Southern areas should consign their cotton to the Association at Whinstanes, Brisbane. All bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; also horse-radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely

all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the Summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondii*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors. Plant bulbs such as anemones, ranunculus, freesias, snowflakes, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

Orchard Notes for June.

THE COAST DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States, if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash, or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry, the tree should then be given a good watering, and when the water has soaked in, the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder, and if the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be

overcome by subjecting the fruit to artificial heat, as is done in the case of bananas during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay, or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bone dust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the Spring should be got ready now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall they should be watered regularly. In fact, in normal seasons, an adequate supply of water is essential, as the plants soon suffer from dry weather, or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt Area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt Area which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district, and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manure—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when it starts growth in spring. Lime can also be applied where required. Badly-drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as if allowed to remain longer on the tree they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.2	5.50	6.18	5.20	6.36	5.3
2	6.3	5.49	6.18	5.19	6.36	5.3
3	6.3	5.48	6.19	5.18	6.37	5.3
4	6.4	5.47	6.20	5.17	6.37	5.3
5	6.5	5.45	6.21	5.17	6.38	5.2
6	6.5	5.44	6.22	5.16	6.38	5.2
7	6.6	5.43	6.22	5.16	6.39	5.2
8	6.6	5.42	6.23	5.15	6.39	5.2
9	6.7	5.41	6.23	5.14	6.40	5.2
10	6.7	5.40	6.24	5.14	6.40	5.2
11	6.8	5.39	6.25	5.13	6.41	5.2
12	6.8	5.38	6.25	5.13	6.41	5.2
13	6.9	5.37	6.26	5.12	6.42	5.2
14	6.9	5.36	6.26	5.12	6.42	5.2
15	6.10	5.35	6.27	5.11	6.42	5.3
16	6.10	5.34	6.27	5.10	6.42	5.3
17	6.11	5.33	6.28	5.10	6.42	5.3
18	6.11	5.32	6.28	5.9	6.43	5.3
19	6.12	5.31	6.29	5.9	6.43	5.4
20	6.12	5.30	6.29	5.8	6.43	5.4
21	6.13	5.29	6.30	5.8	6.43	5.4
22	6.13	5.28	6.31	5.7	6.43	5.4
23	6.14	5.27	6.31	5.7	6.43	5.4
24	6.14	5.26	6.32	5.6	6.44	5.4
25	6.15	5.25	6.32	5.6	6.44	5.4
26	6.15	5.24	6.33	5.5	6.44	5.5
27	6.16	5.23	6.33	5.5	6.44	5.5
28	6.16	5.22	6.34	5.4	6.44	5.5
29	6.17	5.22	6.34	5.4	6.44	5.5
30	6.17	5.21	6.35	5.3	6.44	5.6
31	...	...	6.35	...	...	...

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

		H. M.
5 April	(First Quarter	3 46 p.m.
12 "	○ Full Moon	6 44 a.m.
19 "	) Last Quarter	10 54 a.m.
27 "	● New Moon	3 4 p.m.

Perigee on 10th at 6.36 p.m.

Apogee on 22nd at 8.12 p.m.

The moon will pass, apparently, close to Jupiter on the 11th soon after sunset. If viewed from a higher southern latitude the moon will be seen to occult the planet.

4 May	(First Quarter	10 56 p.m.
11 "	○ Full Moon	4 6 p.m.
19 "	) Last Quarter	4 17 a.m.
27 "	● New Moon	4 4 a.m.

Perigee on 8th at 5.12 p.m.

Apogee on 20th at 2.30 p.m.

On the 8th, between 11 and 12 p.m., the moon will be again very near, apparently, to Jupiter in the constellation Virgo, with the very interesting binary star—Gamma Virginis—slightly below them.

3 June	(First Quarter	4 10 a.m.
10 "	○ Full Moon	1 38 a.m.
17 "	) Last Quarter	10 3 p.m.
25 "	● New Moon	2 20 p.m.

Perigee on 4th at 5.12 a.m. and on 29th at 1.24 p.m.

Apogee on 17th at 9.18 a.m.

The moon will pass Saturn on the 4th at a quarter past three in the afternoon, and will enable this planet to be seen in the daytime if a small telescope or binoculars are directed about six times the moon's diameter northward. It will also pass Jupiter on the 5th a little before four o'clock in the morning, again in apparent proximity to Gamma Virginis. Jupiter will again be occulted in high southern latitudes.

Venus, Jupiter, and Saturn will be evening stars during these three months. Mars will be somewhat later in rising, but will be visible early in the evening during the latter part of the period.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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PART 6.

THE CULTIVATION OF THE PEANUT.

By N. A. R. POLLOCK, Northern Instructor in Agriculture.

DESCRIPTION.

The Peanut, "*Arachis Hypogeia*," also known frequently as the earth or ground nut, is a plant of annual habit, belonging to the natural order Leguminosæ or pod-bearers, and in common with most other members of the pea family has the power of obtaining its nitrogen supply from the atmosphere and storing it up in nodules on the roots.

Unlike other legumes, excepting the Bombarra ground nut, "*Voandzeia Subterranea*," this plant, while blooming above ground, matures its pod or fruit under the surface of the soil. The yellow flowers are borne at the joints where the leaves are attached to the stem, in the bunch or upright varieties at the base of the plant, and in creeper or procumbent varieties right along the stems. Upon pollination taking place the flower fades, and falling off leaves the stalk with a thickened pointed end called the "peg" or "point," which grows down into the soil, where it matures into the pod or so-called nut. It is apparent from this that the soil on which the crop is grown should be of a soft or friable nature or such that a loose surface can be easily maintained.

RANGE.

The peanut can be grown over the whole of Queensland, and while in the cooler parts it only succeeds in summer, in the tropical portions it may be grown at any period of the year where a sufficiency of rain falls.

The period of growth ranges according to variety and climate from fifteen to twenty weeks, the longest period being taken up by the creeper or procumbent varieties.

A moderate rainfall, plenty of sunshine, and a comparatively high temperature best suit the crop, and departures from these may result in a more lengthened period of growth. The crop can also be grown under irrigation.

SOILS.

The nature of the soil on which the crop is grown, besides its fertility, is the main factor in a profitable crop. A loose texture is desirable to allow the pegs to easily penetrate and expand to form the pods and mature evenly, as well as to permit of easy harvesting in freeing the nuts from the soil. Good drainage is also essential, more especially when a heavy rainfall is liable to occur during the growing period.

Light sandy loams are best adapted for the production of peanuts for market as edible nuts, since the shells are clean and bright. Soils inclined to be clayey are apt to stain the shells, and though the berries or peas may be of equal quality, the clean, bright shell, being more inviting, will naturally command a better price. Ill-drained or sour soils are not desirable. Peanuts may be grown on most soils except a heavy or puggy clay, but except in the loose, friable soils they should only be grown for feeding off.

ROTATION.

Peanuts should always be grown in a rotation, as though owing to the roots being harvested the same quantity of nitrogen is not left in the soil as with other legumes, where the whole root system is available, a sufficient quantity of the nodule-bearing rootlets are left to exert an influence on the following crop. At Tolga, in a comparison with potatoes grown on land on which the previous crops were maize and peanuts, the yield on the portion previously cropped with peanuts was estimated by an official of the Department to be 9 tons of tubers as against 6 tons on that previously cropped with maize. In the rotation, however, the peanut, when harvested, should not take the place of the legume or other crop that is ploughed under to restore the organic matter in the soil, and should only be looked upon as adding a quantity of nitrogen. Where the whole growing plant is ploughed under it answers the same purpose as cowpeas, Mauritius, and velvet beans, &c.

In orchards, either as a crop to be ploughed under or to be harvested, the peanut is commended.

FERTILISERS AND LIME.

In common with other legumes, the peanut thrives best in a soil in which there is a sufficiency of lime. Not all soils require the addition of lime, but most soils in districts subject to heavy rainfall, and which give an acid reaction, will benefit by an application of from 5 to 10 cwt. of stone lime or 10 to 20 cwt. of earthy lime or pulverised limestone to the acre, broadcasted (not ploughed in), preferably a week or more before applying commercial fertiliser and sowing the seed. The cultivation of the crop will sufficiently work this lime into the soil. Where any doubt exists as to the necessity of applying lime to the soil, a portion should be limed and the resultant crop compared with a similar area unlimed.

In applying manures for the crop, care should be taken to only apply organic manure in a well rotted condition, and then only in small quantities and thoroughly mixed with the soil. Larger quantities or fresh manure will result in many of the pods being poorly filled. These poorly-filled pods are known as "pops" or "duds."

Organic manures should be applied to a previous crop to get the best results.

As the peanut is a legume and draws nitrogen from the air, this element is not called for in quantity in the fertiliser, but its presence in small quantity, say, 2 per cent. or 3 per cent., will be beneficial. Phosphoric acid and potash will be the chief elements in the fertiliser, and the quantities will be dependent on the soil content. In general, a fertiliser containing from 10 to 12 per cent. phosphoric acid, 2 to 3 per cent. nitrogen, and 6 to 8 per cent. potash will be a good mixture, and may be applied in quantities of from 1 cwt. to 5 cwt. per acre. Such a mixture can be obtained with 1 part sulphate ammonia, 7 parts superphosphate, and $1\frac{1}{2}$ parts sulphate of potash.

The most suitable application will be discovered by applying varying quantities over a small area and noting results, but usually 2 cwt. is sufficient.

Commercial fertilisers are usually applied immediately prior to planting a crop, and as the roots of the peanut do not spread to any distance, the application in the drill with a fertiliser distributor having one or two tines at the back will greatly aid in mixing the fertiliser with the soil.

Ashes from the forest hardwoods, which contain lime and potash, are useful, and may be applied to the soil broadcast in a similar manner to lime at the rate of about 10 cwt. to the acre. These ashes, however, should not previously have been exposed to rain, as then a great deal of their value will have been lost. The ashes of soft woods growing in the scrubs are not considered so good.

SELECTION OF SEED.

As with other crops, in order to secure the best results it is essential that the seed of the peanut should be of the highest grade. Poor seed cannot be expected to yield a good return. In the first planting, seed should be secured from a heavy producing crop and subsequently carefully selected in the field from the heaviest producing plants of the required type. A good plan is to select the nuts from the best producing plants and sow these in a special seed patch, each year selecting the best of this area for next year's seed patch. Nuts harvested for seed should be fully matured, handled carefully, and not picked from the plants for several weeks after curing; they should then be picked by hand and the selected ones thoroughly dried and stored in a dry place free from mice or insect attack. Storage in tanks in a similar manner to maize is most satisfactory.

METHODS OF PLANTING.

The seed can either be planted whole or shelled. Whole nuts may be soaked in cold water twelve to twenty-four hours, drained, dried for an hour or two to assist handling, and then planted. This accelerates germination. Shelled seed should not be soaked.

Where shelled seed is used the shelling should be done by hand, though hand shellers carefully handled are sometimes used. All shelled seed in which the thin skin covering the seed is broken should not be sown, as this injury is liable to affect germination.

Breaking the pods in two answers the same purpose as shelling. Where the seed after planting may be subject to attack by vermin, the seed may be treated by sprinkling with a solution of equal parts of stockholm tar and kerosene. In this case, however, to protect the maturing crop it is advisable to destroy, by poisoning, the vermin beforehand.

Whether planted whole or shelled the operation may be effected by hand or with planters especially designed for the purpose.

AMOUNT OF SEED.

The amount of seed required to plant an acre is about 40 lb. of the whole nuts and from 25 to 30 lb. of whole nuts shelled, varying slightly according to the weight of the nut and the distance apart they are planted. Some growers use as much as 60 lb. per acre of the large podded varieties. It is interesting to note that the whole nut, when planted, provides but one plant, but if shelled and the kernels planted apart, two plants will result.

TIME OF SOWING.

According to the climates of the various districts, so will the time for planting vary.

In the cooler districts, sowings may be made when all danger of frosts is over and the soil can be expected to be reasonably warm, September, October, November, and December being suitable months. In the tropics the crop can be grown practically throughout the year, but consideration must be given to climate and rainfall—*i.e.*, sufficient rainfall should be obtained to grow the crop and fine weather be expected at harvest time.

In the tropical portions of the State, where the monsoonal rain or wet season commences in December, the main crop is sown in January, February, and March, according to the likelihood of reasonably fine weather in the months of April, May, and June or July, when harvesting should occur.

In planting large areas it is recommended to spread the sowings over such a time as will allow of harvesting one lot before the next is over-ripe. Peanuts left too long in the ground are easily detached from the plant and consequently more difficult to harvest, while some varieties are liable to sprout.

LENGTH OF CROP.

The large nuts or creeper varieties require a longer time for growth to maturity than do the bunch or upright varieties, the time varying from fifteen to seventeen weeks for the bunch varieties and from seventeen to twenty weeks frequently for the creeper variety.

PREPARATION OF LAND.

In preparing the land for peanuts the first ploughing may be deep, but the second should not be deeper than 6 in., preferably 5 in. This top 5 in. should be brought to a fine tilth and be free from weeds and trash.

Where lime or ashes have been applied the land is harrowed and drills drawn out, in which the fertiliser, if any, is mixed and the peanuts sown either by hand or with the planter. The drawing of drills may be done with the fertiliser distributor, or the whole operation can be done with a seed drill and fertiliser distributor combined.

Where no seed drill or fertiliser distributor is obtainable, the drills could be drawn out with a cultivator having a wide shovel attachment in the rear, the fertiliser dusted along this by hand, the cultivator then run along the drill with tines set close in front to mix the fertiliser with the soil, and the shovel attachment set at the back to reopen the drill for the reception of the seed to be dropped by hand; this drill should not be deeper than 4 in. from the levelled surface of the soil, and the seed should be covered to a depth of 2 to 3 in., according to the texture of the soil and its moisture content. In light soils where evaporation is great the deeper planting is preferable, but in stiffer soils the shallower covering should be adopted.

A light firming of the soil over the seed is desirable, and this is obtained in the seed drill by a wheel at the rear. When planted by hand the area may be covered with the harrow, or preferably by the cultivator, with tines straddling the drill and set so as to throw the soil inwards.

TIME OF GERMINATION.

Germination usually occurs with shelled nuts in five days, but is subject to the amount of moisture and heat in the soil. The whole nuts take longer unless first soaked in water, as the moisture has to penetrate the shell to affect the berry or pea which contains the germ.

SPACING.

The intervals between drills and the spacings between seeds in the drills vary somewhat, according to the richness of the soil and the variety planted.

The bunch or upright varieties take up much less room than the creeper or procumbent kinds, and the growth of both is correspondingly greater on the richer soil.

In general, the drills are drawn out from 30 in. to 42 in. apart, the distance being influenced by the space required by the cultivating implement.

The spacing of the seed in the bunch varieties may be from 6 to 12 in. apart, and of the creeper varieties from 12 to 24 in. apart in the drill. An instance of success with close planting is noted from an experiment in which, in a light sandy loam, the bunch varieties were planted 3 in. apart in drills 30 in. wide. It is thought, however, in richer soils this crowding of the plants would be detrimental.

CULTIVATION.

Where close planting has been adopted the land may be harrowed with a light harrow shortly after the plants appear through the surface. Otherwise it will be better to use the cultivator between the rows and the hand hoe, where necessary, between the plants. The first one or two cultivations should be done with fine points, as in the strawberry cultivator or the $1\frac{1}{4}$ -in. or narrowest shovel points supplied with the usual 5-tooth cultivator; after this the broader points can be used and later the hilling attachments. In early cultivations the cultivator can work close to the roots, but not deeper than 2 in.; but later, after flowering, when the pegs enter the soil care should be taken that the plant is not disturbed.

In most soils it is desirable to draw a little of the soil in towards the plant to provide a bed of fine earth in which later the pods may form, and this can be done at each cultivation, finally leaving a flat bed in which the plants are growing with a water furrow between each drill. The height to which hilling may be practised depends largely on the soil. Usually, the heavier the soil the more necessity for hilling.

Soil should not be thrown on the centre of the plant; the object of hilling being to provide fine soil for the pegs to enter and mature evenly and for ease in harvesting. As a rule, in the creeping varieties the pegs easily reach the soil, but in certain cases a light roller run over the crop will facilitate this operation. In the bunch or erect growing varieties no rolling should be attempted, but a final higher hilling made if it is noticed the points have some distance to go to reach the soil.

HARVESTING.

The time for harvesting is noted in the appearance of the foliage, which starts to yellow or lose colour, and by examination of the nuts. If the majority of the berries or peas are full grown and the inside of the shell has begun to colour and show darkened veins, the crop is mature and harvesting should not be delayed.

If the crop is harvested too early the proportion of "duds" is very great, while if deferred too long some of the nuts may germinate and others become detached from the plant when lifting, while the tops, having lost most of the leaves, will be of much less value for fodder. In some soils, notably the friable chocolate volcanic loams, the plants may be lifted by hand, when most of the nodule-bearing rootlets are left behind and only the root stock with the nuts are lifted. In other cases it is necessary to loosen the soil before lifting out. In small areas this is sometimes done with the digging fork inserted under the plant, which is lifted while the fork is worked underneath. In large areas a potato digger with an endless belt elevator from the shovel point is found very effective where the soil is dry enough to fall through the slats of the elevator and the crop is free from weeds.

A very satisfactory digger could, however, be made on the farm or by a local blacksmith by attaching to an ordinary wooden plough beam a knife edge to go under the plant and cut the roots just below the nuts; finger bars at the rear of this knife edge would lift the plants and loosen the earth, thus facilitating the lifting by hand. The width of the knife edge should be sufficient between the attaching portions to

the beam to allow of the whole plant passing through, and the depth should be regulated by the wheel or wheels in front. Perhaps a better idea might be given by taking the back off an ordinary earth scoop, together with all the bottom excepting 6 in. in front, and substituting finger bars slightly elevated to carry the plants and attaching the whole to a plough beam with handles. In a digger of this description, where one horse was used, the digging attachment would be to one side of the beam, while with two horses it would be in the centre, the operator straddling the row and the depth regulating wheels being preferably two, one on each side of the line of plants.

Where an ordinary plough is used the share should cut 10 or 12 in. wide and the mould board removed and some rods substituted to prevent the tops being mixed with the soil.

It should always be remembered that the cutting of the roots as close to the pods as possible results in the greater quantity of nitrogen being returned to the soil.

Harvesting should not begin until the dew is off and the tops are dry, and the operation should be regarded as a hay-making of the tops, and not more than can be handled should be lifted in any one day.

CURING.

After the plants are lifted and the soil shaken from the nuts they are allowed to lie either spread on the ground or in small bunches until the leaves are wilted, but not curled or brittle. They are then bound in small sheaves or taken separately and stacked until cured. The time in which the plants are allowed to wilt varies according to the weather, and in some cases stacking may be necessary within an hour of lifting.

The usual method of curing peanuts where the quantity is large is to place them in small stacks around a pole. From twenty to thirty poles will be required for an acre.

These poles should be reasonably stout, from 2 to 3 in. of hardwood in diameter at the bottom end, which should be sharpened. When erecting, holes are made in the soil with a crowbar, post-hole digger, or earth auger, and the pole inserted or driven down with a mallet to a depth that will ensure their not being blown over with the weight of the stack upon them. Crosspieces about 3 ft. in length are now nailed across the post at right angles, one immediately above the other, 9 to 10 in. above the level of the ground; 3 by 1-in. hardwood battens answer the purpose admirably. According to the crop, six or seven rows are taken on each side of the poles, and the plants, when wilted, forked into one row on either side of the pole. When stacking, a few vines are placed across the crosspieces, which keep them off the ground, to form the foundation. The vines are then stacked by hand with the nuts next to the pole and tops outward, pressing down each layer and building evenly around the pole. From time to time a bunch should be divided and hung around the pole to bind the mass and to assist in keeping the centre high.

This latter is important in that it allows any rain falling to run off. When the stack is approaching 3 ft. high the vines should be drawn closer round the top and finished off with a cap of grass as a thatch to run rain off. It is important that free circulation of air should obtain through the stack in order to facilitate curing. The building of thick or high stacks or pressing them too tight will tend to cause heating, with consequent damage to both fodder and nuts.

After about two weeks in the stack the peanuts may be stored in the barn, but the nuts should not be picked from the vines until preferably six weeks from the date of harvesting, as if picked too soon they are liable to shrivel, and there is danger of fermenting or moulding after picking.

PICKING.

The usual practice in this State has been to pick the nuts from the cured plants by hand—a tedious process, the cost of which, if the ruling rate of wages were paid, would be prohibitive, since 60 lb. is considered a fair day's work. This practice of hand picking has been followed for ages, and is still the usual method adopted in countries such as India, China, Japan, &c., where labour is plentiful and cheap. In certain cases, too, the nuts are washed by agitation in frequently changed water and dried in the sun to obtain a clean inviting article for edible purposes. This is necessarily a costly undertaking, and would need a much higher price for washed nuts to compensate.

Other methods adopted in North Queensland with a lessening of expense have been, in the case of the bunch nuts, to hold the stems in the hand and thresh the nuts off by beating across tightly-drawn wires or the edge of a board placed midway across

a box or other receptacle to hold the nuts, and with both bunch and creeper to rub the whole plant over a wire netting drawn tight until the nuts fall through. Subsequent winnowings remove trash and light pods, and it is stated thoroughly drying the resultant nuts in the sun will cause the stems or tails to break off in the bags, resulting in a clean sample when it reaches the market.

In other lands, however, labour and time saving machinery has been evolved which does very satisfactory work in picking, stemming, cleaning, grading, and bagging for market, without breaking or damaging any appreciable quantity of the pods.

Two types of pickers are on the market in the United States of America—one working on the principle of a cylinder grain-thresher and the other one in which the plants are drawn between spring points over a wire mesh in such a manner that the nuts are pulled off and fall through on to a conveyor, which carries them through a winnowing process to a stemming apparatus, after which they go through a further winnowing and a cleaning and grading process. Two machines of the latter type are in use in the Cooktown and Tableland districts respectively.

The cost of machines of this description is too great for the individual in most cases, and it would be advantageous, where any considerable area was under crop, for farmers to co-operate in the purchase, when the machine, which is on wheels, could be transported from farm to farm.

Contract picking is a feature in the United States just as contract chaffcutting is in Australia. The picking crew, working day after day, naturally become expert; so that a greater average quantity is handled daily with less damage than when novices or hands out of practice are engaged.

When a power-driven picker is in use it is advantageous to place it in a central position in the field where the poles with the stacked peanuts can be transported bodily to the machine, resulting in less handling. With suitable uprights with a cross bar attached to the dray a lever with a grip attached to the top of the pole and passed over the cross bar would use it as a fulcrum, when the long end of the lever being lowered to the shaft would lift the pole entirely clear of the ground, allowing of its quick and easy transport to the picker.

The stems or vines of the plant, after the nuts are detached by the picker, can be stacked, baled, or chaffed and used for forage purposes, while the "dud" nuts (small or immature) can be fed to stock.

MARKETING

The nuts are usually bagged whole and shipped to the buyer, but where freights are high it is sometimes more remunerative to market the kernels only.

Special machinery is available to shell peanuts with a minimum of damage to the kernels. Bruising of the kernel at shelling or during transport is injurious, as decomposition is liable to set in and rancidity occur.

Shelled kernels should also be absolutely dry before packing for the same reason. Each variety should be kept distinct, whether shelled or unshelled, as oil millers are understood to give lower prices when the kernels are of different colours.

DISEASES.

The peanut is seldom subject to disease when grown under proper conditions of soil and drainage. The most common disease noticed in Queensland is a form of leaf spot (*Cercospora* sp.) which appears as brownish spots on the leaves and is most frequent on sour or poorly drained land. When this appears late it will be possible with the upright growers to mow the tops and make hay before they are too far gone. Another disease that has been noticed on occasion is a kind of fungus attacking the stem where it enters the ground and is characterised by a cobwebby appearance, due to the mycelial threads of the fungus on the stem just below the surface, together with the appearance of minute round white or brown bodies the size of mustard seeds, which are the spore cases of the fungus. A proper system of drainage, together with liming and a rotation of crops, will minimise disease in the peanut as with other crops.

PESTS.

Insect pests are of infrequent occurrence, so far the only attack noticed in the State being odd instances of mealy bugs on occasional roots.

Vermin are very partial to the nuts, as are many birds outside those domesticated.

The duty recently imposed by the Commonwealth on peanuts and peanut oil is as follows:—On peanuts from the United Kingdom, 2d. per lb.; other British countries, 3d.; foreign countries, 4d. On edible oils, which include peanut oil:—From United Kingdom, 2s. per gallon; other British countries, 2s. 6d.; foreign countries, 3s.

The protection afforded by this tariff should compensate for the additional costs in growing under white labour conditions in Australia, and peanuts should become a staple crop in North Queensland.

YIELD.

The yield of the peanut crop will, of course, depend on the fertility of the soil, amount of rainfall, and attention bestowed.

While it will bear a satisfactory crop under a small rainfall, showing to an extent that it is drought resisting, it is not injured by excessive rains provided the soil is well drained. An instance of this was observed at Banyan in 1921, where a perfect sample of the Red Cross variety was seen which had experienced a fall of 120 in. of rain in the growing period.

Crops on a small scale have been estimated to produce 3 tons to the acre, and in the North field crops averaging 1 ton and over are not uncommon; but as a general rule, in satisfactory soils and under ordinary conditions with proper cultivation, 15 cwt. per acre might be expected as a fair average yield.

Where the crop grows to perfection, as at Cooktown and the Tableland, there is a fine opportunity for the institution of a co-operative oil mill and the purchase co-operatively of labour-saving machinery in picking, &c. In the growing of peanuts for marketing as whole nuts, it frequently happens that the product is not readily saleable owing to stained shells, glutted market, or other causes, when the presence of an oil mill will be advantageous.

The districts mentioned are in a particularly good position for the establishment of an oil mill, since freight on the whole nuts to the Southern parts is high and a ready market for the cake is to be obtained from the dairymen and pig-raisers near at hand.

THE PEANUT.

As a commercial crop the growth of the peanut in Queensland has not been favoured to any extent during past years, since, according to departmental statistics, the areas under cultivation and yields were:—1919: 153 acres; yield, 127,708 lb.; average per acre, 835 lb. 1920: 272 acres; yield, 274,916 lb.; average per acre, 1,011 lb. 1921: During these years the amount of nuts imported into Australia of various kinds, including peanuts but excluding almonds, was:—1919: 3,998,314 lb.; value, £96,056. 1920: 6,955,646 lb.; value, £271,087. 1921: 4,959,771 lb.

It is unfortunate that the peanuts, when imported, have been included with other edible nuts such as Brazil, Barcelona, walnuts, &c., so that accurate figures are not obtainable, but it is certain that a goodly proportion of the quantities enumerated can be credited to peanuts.

The imported unshelled nuts may be said to be wholly, and the Australian grown to be almost wholly, used for edible purposes in the parched form or in confectionery.

This use of the peanut, though it is capable of expansion, cannot be said to offer very great inducement to largely increased areas in the State; but when the other uses are considered there is every inducement to push the industry of peanut-growing forward.

A report, culled from the "American Trade Review," states that Professor Carver, Chief of the Research and Experiment Station at Tuskegee Institute, U.S.A., exhibited before the Ways and Means Committee of the House of Representatives at Washington, D.C., over 100 varieties of products from peanuts, including oils, milks, butters, flours, meals, breakfast foods, relishes, sauces, flavourings, many kinds of confectionery and prepared nuts, wood stains; different kinds of stock foods prepared from the nut and vine; and also a black ink and a face powder and face cream.

This is interesting as denoting the diversified uses of the plant; but at present the commercial uses may be briefly summarised as:—

- The whole plant as a stock food either to be harvested, stored, and used as required or to be fed off;
- The plant, exclusive of the nuts, cured as hay, in which it is close to lucerne in food value, and fed to stock;
- The nuts for edible purposes, either whole, parched, or salted, or shelled, and used in confectionery;
- The nuts for oil;
- The residue after extracting the oil, in some cases, for edible purposes, but mainly for stock food or as manure.

The whole plant when used as a stock food has proved of great value in pig-raising either by being fed off or harvested and stored for use. With the upright or bunch varieties the tops are frequently mown for hay, and, after this has been carted off, the pigs turned in to harvest the nuts. Comment has been made on the effect of the nuts producing a soft pork, especially when such is the main diet. The addition of other foods, especially when topping off, should to a large extent overcome this. No difference can be noticed in the appearance of the peanut-fattened pig and one fattened on corn; and if the corn is not intended for bacon, no lowering in value need be expected. The foregoing applies mainly to crops fed off; but where the crop is harvested and the nuts or a portion marketed as such, no objection is raised.

In the form of hay, as the whole plant less the nuts is called when cured, the peanut affords a valuable fodder, which is rich in protein and rivals lucerne in feed value. The following analyses are instructive as a comparison between peanuts and lucerne:—

	Total Dry Matter.	DIGESTIBLE NUTRIENTS IN 100 LBS.				
		Crude Protein.	Carbo- Hydrates	Fat.	Total.	Nutri'tive Ratio.
Lucerne	91.4	10.6	39.0	0.9	51.6	1 3.9
Peanut Vine	78.5	6.6	37.0	3.0	50.4	1 6.6
Peanut Vine with Nuts	92.2	9.6	39.6	8.3	67.9	1 6.1

In palatability, probably the peanut hay is ahead of lucerne, as stock greedily eat the hard, sun-dried stems no matter how long exposed.

In feeding the hay or the whole cured plant to horses and cattle, the receptacle should allow of any soil adhering to the roots falling through; and the danger in feeding mouldy peanut hay is the same as with mouldy hay of any other kind.

The nuts as used for edible purposes are familiar to all, and, before the plague restrictions, were probably most familiar to the frequenters of music-halls and picture-shows.

Washed or brushed nuts with a clean, bright shell are naturally sought for this trade, the larger nut being most in demand—not that it is more palatable, but probably because being larger, and the berry not so full, it is easier shelled; still another reason is that, bulk for bulk, it is lighter than the bunch nut, and being sold by measure goes further.

Prepared for sale as whole nuts, the process is either to salt or to parch by exposure to a fairly high temperature without, however, scorching the shell.

In confectionery, the peas or kernels only are used, and are first blanched by removing the thin outer skin and degermed. They are used in place of almonds as icings, toffees, rocks, and in other ways too numerous to mention.

The blanched and degermed berry is also roasted and ground to make peanut butter, salt being added to flavour. See "Queensland Agricultural Journal," February, 1921, page 77.

The chief value of the peanut is as a source of oil; and this oil is the most important of the world's food oils. In past years the production of peanuts was largely confined to India, China, and other tropical parts of Asia; but now large acreages are planted in Africa and America. As illustrative of one country's increase in production, the average annual export of the British colony of Nigeria during the five-year periods ending 1905, 1910, 1915, and 1920 was 513 tons, 1,572 tons, 9,778 tons, 48,500 tons; the greatest quantity shipped in one year being 57,554 tons (Bulletin Imperial Institute Vol. XIX No. 2). In the south of the United States, peanuts first became commercially important in the year 1870, and gradually increased in importance up to 1900; since when the industry has expanded enormously. In 1889 only 3,588,143 bushels of nuts were produced (U.S. standard bushel = 22 lb.). The production increased to 12,000,000 bushels in 1911, and to over 40,000,000 bushels in 1917, in which year the area under crop was over 2,000,000 acres. Up to 1914 peanut oil was not imported or produced to any considerable extent; but, in 1916, 2,000,000 gallons of the oil were imported and 3,488,649 gallons were produced in the country, mostly from the shelled nuts (Year Book, U.S. Department of Agriculture 1917).

In France, at Marseilles, enormous quantities of peanuts are imported, both whole and hulled, from which many millions of gallons of oil are expressed, something like an average of 40,000,000 gallons being produced yearly, prior to the war.

Peanut oil in bulk is known to the trade as China oil.

Under this heading Commonwealth imports are given as in 1919: 107,742 gallons, valued at £34,215. 1920: 47,820 gallons, valued at £20,276. 1921: 58,966 gallons.

The finer grades of oil are included with various other vegetable oils in small containers, and the quantity cannot be arrived at; but the total values of this class of oil imported were—In 1919, £28,327; and 1920, £36,502.

The total values of the importations is not very great; but the various uses to which the oil can be put would create a market, if locally produced, far in excess of these figures.

Amongst the uses of the oil are—Finest oil as salad oil and for use in medicine, the arts, and as a lubricant for high-speed journals in delicate machinery, &c.; first quality grade for cooking, and in the manufacture of margarine; also as a lubricant and harness-dressing, &c.; lowest quality grades for soap-making and other industrial purposes.

Peanut oil is generally used in the cooking of sardines and other fish sold in oil, as olive oil will not stand the high and continuous heating necessary: The fish are first cooked in the peanut oil; then drained, put in cans, and the cans then filled with olive oil. For much the same reason peanut oil is preferred by cooks to olive oil in other branches of cookery. The oil is also becoming popular with manufacturers of lard substitutes, who harden the oil by hydrogenation.

The extraction of the oil from the nuts is a simple process, and entails less procedure and machinery than other oil-products. The bulk of the oil is obtained by simple pressure, and the balance on heating and again subjecting to pressure.

In the United States more attention has been paid to special machinery for the expression of peanut oil than elsewhere, though cotton-oil mills have in many cases been adapted for the purpose.

The "Expeller" system, it is claimed, reduces the amount of machines to a minimum; the one machine extracting the oil in two operations—one cold, and the other after heating the residue from the first pressing. Other systems require the nuts to go through a series of crushing-rolls first, and then through hydraulic presses, when, the first oil being expressed, the meats are broken up, heated, and pressed a second, third, and sometimes a fourth time.

In preparing the peanuts for oil expression, they are first put through grading and cleaning machinery to get rid of unfilled nuts, dirt, and other foreign matter.

The nuts may be treated either whole or shelled, the latter always being the case when the highest grade oil is required. Special machines are in vogue for shelling, blanching, and degerming.

When preparing for high-grade oil, the shelled kernels are passed over a picking-table on a slowly moving belt, alongside which are seated operators who pick out any trash or bad nuts not removed in the previous cleaning process.

The blanching process consists in removing the thin skin covering the kernel. This skin contains about 13 per cent. of oil, and is included with the material when expressing the lower-grade oil. The blanching machine consists of a set of brushes revolving against a corrugated plate. When most of the skins are removed, the kernel separates into halves, and the germ becomes loosened.

The meats are then separated from the skins and germs by passing them over screens in front of a fan. The skins are blown out, and the germs fall through the screen, which should have round holes about $\frac{1}{4}$ in. in diameter. The germ is added to the material for lower-grade oils, as the oil it contains is of lower quality than that of the rest of the kernel.

From the blanched degermed kernels the highest grade of oil is obtained; this is practically colourless and inodorous, possessing a pleasant, nutty flavour, which commends it as a salad oil. In certain cases the oil is further refined by passing it through charcoal filters.

The various grades of oil command prices according to their degree of purity. Oil expressed from whole nuts may be refined; but the highest degree of purity is obtained as outlined in the expression from shelled nuts.

The presence of damaged kernels will lower the quality of the oil. For ease of transport, nuts are frequently shelled before marketing, and, unless thoroughly dry, are apt to heat, causing the presence of a free acid in the resultant oil. In analysis this is expressed as an acid value, being the number of milligrams of caustic potash required to neutralise the acid in one gram of oil.

The resultant cake or meal after the expression of the oil from the shelled nuts is used for the preparation of human foods as meals, flours, and breakfast foods, &c., and also as with the cake formed in the treatment of the whole nuts as a stock food or fertiliser.

An average analysis of peanut oil cake shows, according to Henry and Morrison:—

	Total dry matter in 100 lbs.	DIGESTIBLE NUTRIENTS IN 100 LBS.				Nutritive Ratio.
		Crude Protein.	Carbo-Hydrates.	Fat.	Total.	
From whole nuts ..	94.4	20.2	16.0	10.0	58.7	1 1.9
From shelled nuts ..	89.3	42.8	20.4	7.2	79.4	1 0.9

The feed value of these products is at once apparent, and, viewing the richness in protein as evidenced in the nutritive ratio, it becomes most valuable as a concentrate for addition to stock foods in making a balanced ration.

For oil production the bunch or upright varieties are favoured, especially the Red Cross. These varieties, having an upright growth, also lend themselves to a mowing of the tops, and, as well as being easier harvested, yield a heavier crop of nuts than the creeper or procumbent varieties.

A MARKET FOR PEANUTS.

One of the objections, from the producer's point of view, to the peanut as a crop has, up to now, been the impossibility of disposing of the culls—that is, the small, broken, discoloured, and shrivelled nuts unfit for either the roasting or confectionery trade; but this has been overcome now by the establishment of an oil mill at Marrickville, Sydney, which will provide an outlet for these culls, which can be used for oil crushing.

The price for oil milling nuts will naturally be world's parity, as otherwise it would be impossible to successfully compete with imported oil. It is realised that the world's parity price for milling nuts for the whole of the growers' crop would not be a paying proposition to the farmer, and to ensure a full return to the producer the milling company will receive locally-grown nuts, which will be graded for (1) confectionery trade, (2) roasting trade, (3) culls, which will go to the mill for oil crushing.

The Australian-grown nut must compete with the Chinese nut, which arrives here perfectly graded and nearly 100 per cent. usable for the purpose for which it is bought; consequently the successful marketing of the local nut depends entirely on the establishing of a grading house for handling the nuts on the lines indicated above.

The Australian grower is very handsomely protected with a tariff of 4d. per lb. for peanuts in the shell and 6d. per lb. for peanut kernels. In the United States, America, the peanut industry has grown into huge dimensions, competing successfully with the Chinese nut on a protective tariff of three-eighths of a cent. per lb. on nuts and three-quarters of a cent. per lb. on kernels. The American tariff, as compared with the Australian tariff, is as follows:—Peanuts in the shell: America, £1 14s. 6d. per ton; Australia, £37 6s. 8d. Kernels: America, £3 9s. per ton; Australia, £56. The effect of the heavy Australian duty has been to curtail the sale of peanuts. There was at one time a big trade for children's "penny bag" peanuts, but the small quantity which can now be purchased at this figure is not attractive. If the Australian grower takes the full advantage of the tariff protection, this state of affairs will continue. The nuts will be graded by the company into (1) confectionery, (2) roasting, (3) milling. The advantage of the protective tariff can only be looked for on grades 1 and 2, as the price of milling nuts will be regulated by world's parity and the local price of imported oil. Even in the milling grade the Australian grower will have the advantage in price over imported nuts to the extent of the freight, &c., from outside markets.

To obtain the best results—that is, a high percentage of confectionery nuts—the farmer should make certain that the soil, climate, and rainfall are suitable and proper methods of cultivation adopted. Advice on these points can be obtained from the Department of Agriculture. Another point of importance is the selection of a variety and type of nut suitable to the district, and the class of trade for which the grower proposes to cater. For the roasting trade the large nut known as the China is most suitable. The Valencia nut, which is not quite as large as the China, but carries almost as big a kernel, is most suitable for the confectionery trade, while the variety known as the Spanish is the best for milling, as it contains a very high percentage of oil, and the crop from this variety is the more prolific. This nut, owing to its flavour, is also fast growing in popularity with the confectionery trade.

The plant installed at Marriekville is capable of handling 2,000 tons per annum, but with slight additions the capacity can be doubled. The principal objection to the peanut crop—that is, the impossibility of disposing of the culls—is, through the establishing of this mill, now overcome, and the crop should be well worth the consideration of farmers where the soil and climatic conditions are suitable.

REINFORCED CONCRETE TANKS.

SPECIFICATION FOR CONSTRUCTION ABOVE GROUND.

Excavation.—Excavate for floor of tank as shown. Excavation to be cut to the neat dimension and surface well tamped to form a solid foundation. Any filling-in required is to be done with broken stone tamped so as to form a solid foundation.

Reinforcement.—The reinforcement for floor and sides should first be put together and the reinforcement for top of tank prepared so that it can be put on immediately plastering of walls is near completion. Floor reinforcement to be placed as shown, about three-quarters ($\frac{3}{4}$) inch from underside of concrete bottom of tank. Then place expanded metal all round sides of tank, fixed horizontally to light skeleton framing and locked according to manufacturer's directions. All this reinforcement is to be securely bound together with number sixteen (16) gauge wire so as to form a rigid frame. Reinforcement in top of tank to consist of expanded metal in single lengths across top of tank, locked together as before, cut and bent over into sides of tank and wired together. Form circular manhole as shown. Remove skeleton framing before inside plastering is commenced.

Temporary centring of three-quarter ($\frac{3}{4}$) inch boards is to be used to support top until cement is set.

Concrete Floor.—Floor of tank to be of concrete five (5) inches thick. Concrete is to be composed of four (4) parts stone, broken to pass through a three-quarter ($\frac{3}{4}$) inch ring, two (2) parts clean sand, and one part Portland cement. It shall be mixed on a wooden platform, turned over twice (2) dry and three (3) times while water is poured on, and thoroughly incorporated, and must be used quite fresh. Concrete to be well settled around reinforcement and the whole floor well tamped.

Cement Plaster.—Walls and top of tank to be formed of cement plaster one and a-half ($1\frac{1}{2}$) inches thick, composed of one (1) part cement to two (2) parts clean sharp sand. Care must be taken in mixing the plaster to make it of the exactly right consistency, as no cement or sand must be added for drying and no water added for moistening whenever the plastering is commenced.

Render the floor of the tank with cement similar to the above three-quarter ($\frac{3}{4}$) inch thick.

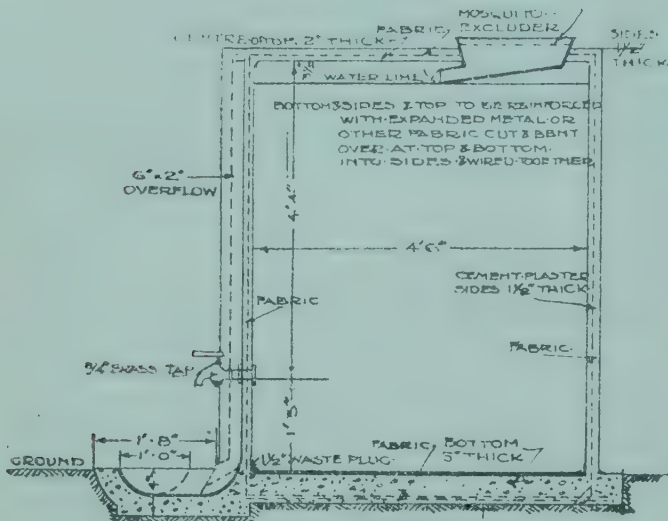
NOTE.—Top of tank to be two (2) inches thick in centre, weathered to one and a-half ($1\frac{1}{2}$) inches at sides.

Waterproofing.—All concrete and plaster to be mixed with "Toxement" or other good waterproofing compound, mixed to manufacturer's instructions.

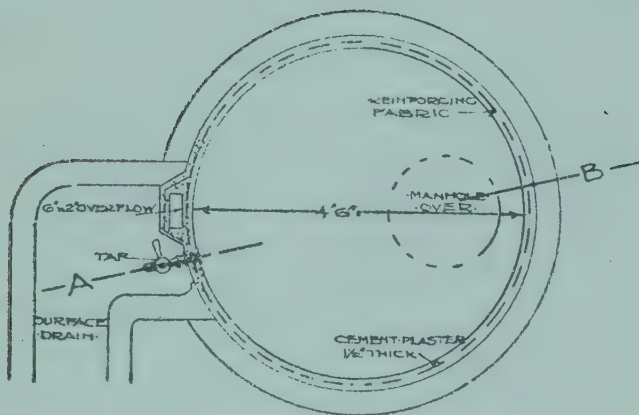
Construction of Tank.—The concrete and cement portion of tank must be completed in one operation, and no initial set must be allowed to take place in the cement before any unfinished edge of plaster is carried on. The holding capacity of the tank depends entirely upon the tank being made monolithic, and the importance of this must not be neglected. The concrete floor should be started immediately on commencement of work in the morning. As soon as the floor is laid the plasterers must start, so that the junction between wall and floor shall be continuous. As many plasterers as can conveniently work must be put on, working together inside and outside the walls, and care must be taken that the cement is well filled into the reinforcement. As soon as the walls are completed to the top of the tank a layer of cement is to be placed upon the centring and the expanded metal for top, which should be ready for

immediate use, must be placed, and the top of the tank plastered as before. The whole of the plastering shall be completed in one operation and worked to a smooth and even surface inside and out, and all angles should be rounded or filleted.

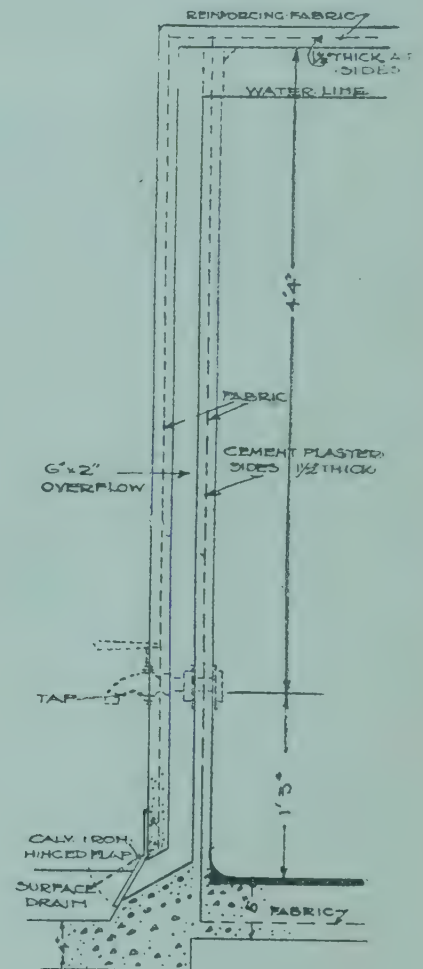
•	REINFORCED CONCRETE TANK.	•
•	ABOVE GROUND.	•
•	CAPACITY TAP LEVEL 400 GALS.	•
•	" " GROSS 525 "	•
•	SCALE HALF INCH TO 1 FOOT.	•



SECTION A-B



PLAN



1/4 INCH SCALE.
DETAIL OF
OVERFLOW.

Geo. F. Hunter.
2-5-22
CHIEF ARCHITECT.

Overflow.—Provide collapsible core from overflow of two (2) inch pine in three (3) pieces wedge-shaped, and remove same when concrete is set. Care to be taken that parts of core to be withdrawn from lower part of overflow be so made that they will easily pass through hinged flap. Leave opening in top of tank, both in concrete and expanded metal, about six (6) inches diameter, with bevelled edges, immediately over overflow, so that upper part of core can be withdrawn. Fill in opening flush when core has been removed. Build in galvanised iron frame and hinged flap at bottom as shown.

Tap and Cleaning Plug.—Provide and build in, where shown, a three-quarter (3/4) inch low pressure brass tap, also one and a-half (1 1/2) inches diameter cleaning plug. Tap to be fixed in position before plastering is commenced, and plaster worked up close all around same where it passes through wall of tank. Pipes passing through

walls of tank to be threaded full length. Put circular metal washer on outside under tap and cap to clean out pipe, and screw up tight.

Mosquito-proofing.—Provide and fix mosquito-excluder to manhole in tank.

Drain.—Form drain under tap as shown and properly connect to surface drain.

Keeping Damp.—Keep the whole of the concrete and plaster walls damp, both inside and outside of tank, for at least fourteen (14) days after completion, keeping tank well covered with old sacking during that time.

Removing Centring.—Remove centring at the same time that sacking is removed.

NOTE.—All centring, especially core for overflow, to be given a good coat of soft soap before plastering is commenced.

Cleaning out.—Thoroughly clean out the inside of the tank at completion.

SPECIFICATION FOR CONSTRUCTION UNDER GROUND.

Excavation.—Excavate for tank as shown on drawings to neat dimensions with clean cut sides and well tamped at bottom to form a solid foundation.

Bottom of excavation to be level and sides plumb and free from loose earth.

Concrete Work—Materials.—

Sand.—To be first quality fresh water deposit, sharp and coarse; clean and wash if necessary so as to be free from all impurities.

Gravel.—To be best river gravel procurable or clean broken hardstone to pass through three-quarter ($\frac{3}{4}$) inch gauge and free from dust and all other impurities.

Water.—To be clean and fresh.

Portland Cement.—To be of the best quality.

Waterproofing.—All concrete and rendering to be mixed with “Toxement” or other good waterproofing material, mixed to manufacturer’s directions.

Concrete.—To be composed of four (4) parts of gravel or broken hardstone to pass through three-quarter ($\frac{3}{4}$) inch mesh to two (2) parts of sand to one (1) part of Portland cement.

Mixing.—The concrete is to be mixed upon a platform and the aggregates accurately measured as above.

The sand, gravel, and cement to be spread in layers upon the platform and mixed three (3) times dry or until of a uniform colour and to be turned over three (3) times while the water is being applied, which is to be poured on slowly and with care, and the whole thoroughly incorporated. Concrete after mixing is to be used at once. Well ram as the work proceeds, and the whole to be left with a smooth level surface.

No concrete which has once taken its initial set shall be worked up or used again in the works.

All concrete to be protected and kept free from dirt.

Casing.—Provide casing for walls and top of one (1) inch boarding well strutted and laid with close joints and well wetted before depositing the concrete.

Reinforcement.—To be of expanded metal or other good fabric and locked together according to manufacturer’s directions and securely bound together with number sixteen (16) gauge wire so as to form a continuous and rigid frame throughout. Top and bottom fabric reinforcement to be bent up or down and tied to that of sides.

The fabric reinforcement to be placed in walls two (2) inches from outer face of walls and one (1) inch from underside of top and bottom, as shown, and to be temporarily blocked out to keep in position while concrete is being filled in, all blocks being removed as the concrete is laid.

Concrete Work.—The sides and top to be three (3) inches thick and the bottom five (5) inches thick, with sinking to centre as shown.

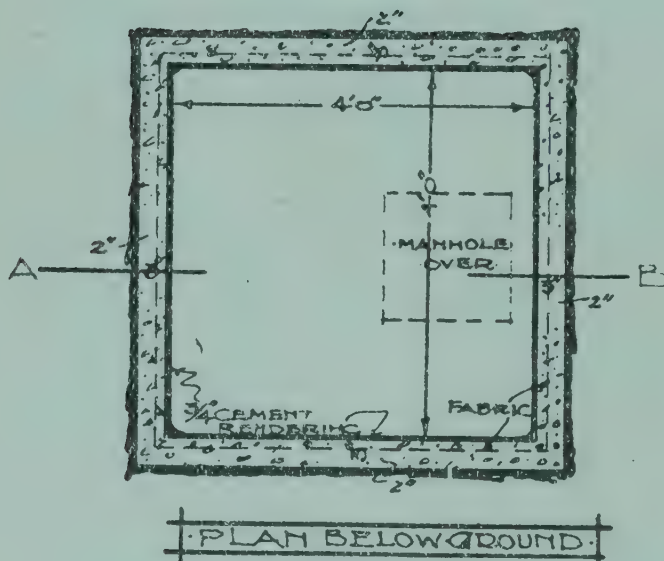
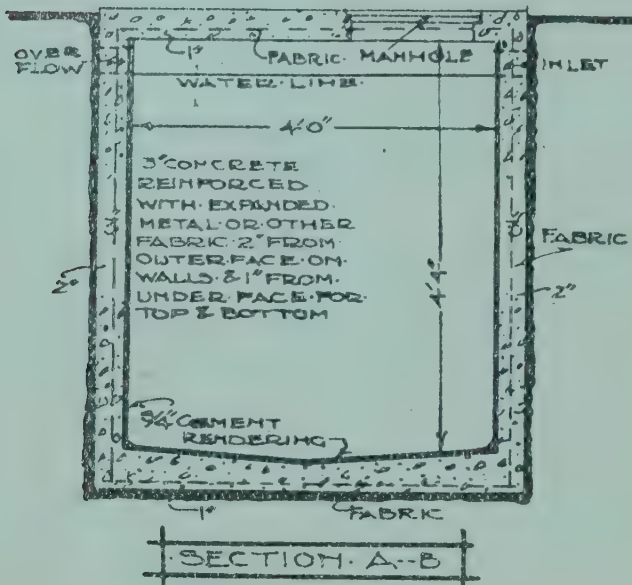
The bottom to be laid first and well tamped. The junction of walls and bottom to be continuous and the sides to be filled in twelve (12) inches layers and spread and settled around and through reinforcement and carefully tamped as the work proceeds.

The top to be laid on centring with one (1) inch layer of concrete; the reinforcement fabric is then to be placed in position and tied, and the remaining two (2) inches of concrete to be carefully laid.

The work should be continuous, as the tank should be monolithic. Should it be necessary to stop work so that concrete sets, when recommencing work the existing bed of concrete shall be brushed perfectly clean, well watered, and grouted with equal parts of cement and sharp sand.

Rendering.—Render the whole of the sides and bottom as shown while the concrete is green with mortar composed of two (2) parts sand to one (1) part of Portland cement and three-quarter ($\frac{3}{4}$) inch in thickness, finished to a good smooth surface with steel trowel, all angles to be rounded or filleted.

REINFORCED CONCRETE TANK.
BELOW GROUND.
CAPACITY 400 GALS.
SCALE HALF INCH TO 1 FOOT.



Manhole.—Form rebate in top for manhole and fill in with cast-iron manhole cover with lock and key.

Inlet, &c.—Set pipes for inlet and overflow as the work proceeds.

Keeping Damp.—Keep the concrete top damp, covering with wet bags, for at least fourteen (14) days after completion.

Removing Centring.—Remove centring fourteen (14) days after completion of the top.

Clean out.—Thoroughly clean out the inside of the tank at completion of work.

THE ALGAROBA BEAN (*PROSOPIS JULIFLORA*): IS IT LIKELY TO BECOME A PEST?

Mr. J. Locke, of Mackay, writes questioning the value of the Algaroba tree as a fodder plant, and suggests that, as such, it is much overrated. *Inter alia*, Mr. Locke says:—"In 1915 I procured some seeds of this so-called king of all fodder plants. The seeds germinated freely, and I transplanted half a dozen young trees, which have since flowered and borne crops of beans. The trees bristle with thorns, and it is almost impossible to pick the beans from the boughs in the centre of the bush. After the beans are gathered they must be dried and then ground in some machine. Upon consideration it will be apparent that the cost of labour involved by all these operations is more than the value of the product. As a fodder plant the Algaroba will not bear comparison with many cereals or legumes, and as a standby in time of drought its value when compared with ensilage is infinitesimal. As a pest, if it gets a grip of our rich scrub lands it may become as great a curse as lantana or prickly-pear. I write to sound a note of warning and advise intending planters to exercise caution when buying these much advertised novelties, which are often not worth the care bestowed upon them. Certainly the Algaroba has been tried and found wanting."

In this connection it is interesting to note that the Government Entomologist and Plant Pathologist (Mr. Henry Tryon) some time back addressed the following letter to the Under Secretary, Department of Agriculture and Stock:—

"This tree has been pronounced to be 'one of the most valuable sources of feed in Hawaii,' alluding to its place amongst leguminous forage plants. It is one of the mesquite trees and was formerly introduced from Mexico in order primarily, it is understood, to clothe the more arid portions of that region, and so induce rain, or obviate the too rapid loss of such as had already fallen. From my personal observations of the habits of the Algaroba, both in the Hawaiian Islands and in the part of North America from which it originally emanated or nigh thereto, I have come to the conclusion that it is likely to become a serious pest anywhere where its employment is not essential for the purposes alluded to—as appears to be the case in regard to Queensland. Its habit where growing spontaneously (and it most readily becomes naturalised) is to form a veritable thicket of an impenetrable character, to the exclusion of other vegetation or useful vegetation. How widely it may become disseminated will appear from the fact that it is the beans or pods of the tree, on falling to the ground and where accessible, that cattle almost exclusively consume. For on consuming them they do not digest the seed, but pass it out with their droppings, to be just in the condition favourable to its germination. (This, of course, does not apply to the use of the pods by dairymen and livery stable men, who pick up the small pods from under the trees for the purpose, first kiln-dry them and grind them, seeds and all.) However, 'when milch cows are fed on Algaroba milk consumers complain of a bad flavour in the milk' and 'in some cases bowel trouble in children has been attributed to the feeding of the Algaroba (to cattle) by dairymen' (C. K. McClelland)."

The matter being referred to the Government Botanist (Mr. C. T. White, F.L.S.), that officer replied as follows:—

"In importing foreign plants for either æsthetic or economic purposes, it is well to take into consideration experiences in other parts of the world with the particular species imported. It must be remembered that quite a number of our pests were imported for definite purposes—thus, the lantana, billy goat weed or bluetop, and water hyacinth were imported as garden plants, while the prickly-pear and wait-a-while or hold-me-back (*Casalpinia sepia*) were introduced as hedge plants.

"In regard to the Algaroba, J. F. Rock, the leading authority on the plants of the Hawaiian Islands, states that 'No tree so far introduced has proved of such enormous benefit to these islands as the Algaroba . . . all the waste lands which previous to the introduction of this tree were absolutely barren are now covered by green forests made up exclusively of this tree.' In the Hawaiian Islands its principal use has been to cover large previously treeless mountain areas and so prevent soil

erosion and the too rapid loss of rain that had fallen; its use as a fodder-tree plant, firewood, and tanbark are probably secondary values.

"In the southern United States, where the plant is a native, opinions are not so definite on its value. There its value is particularly confined to its use as a fodder, and in this connection J. S. Smith, in Bulletin No. 2 of the Division of Agrostology, U.S. Department of Agriculture, states:—'It is the most common tree of the mesas of the South-western United States, and because of its many uses is an exceedingly valuable species. Experiments in a small way have been made to preserve the beans for winter feeding, with partial success only, because of a small weevil that bores into them after they are gathered and renders them unfit for stock feed. One acre of land well covered with mesquite trees often produces not less than a hundred bushels of the beans per annum. The mesquite bean is looked upon by some as a curse and by others as a blessing. The trees are spreading with great rapidity since prairie fires are no longer set to keep this and other weedy plants in bounds. Within the last twenty years the mesquite bean and the prickly-pear have covered many square miles of land in Texas which was formerly open prairie. There is no doubt that the amount of grazing has been diminished by the spread of mesquite brush. On the other hand, the beans are of decided value in times of drought, when grass is scarce. It is probable that the mesquite bean is now of less value than formerly, before it was known that alfalfa could be successfully grown for winter feed or the hay used in times of drought.'

"Writing in the same series (Bulletin No. 10) on the grasses and forage plants of Central Texas, H. L. Bentley states:—'As, bushel for bushel, they are quite as valuable for feeding stock as cow peas, it will be seen that for forage purposes the mesquite tree is an important factor in this section, where there are millions of them.'

"From the foregoing it would seem the greatest danger from this tree would be from its spreading over areas carrying valuable native grasses, as in the Central, Northern, and Gulf districts, where it might crowd out the native grasses and herbage and so lessen the carrying capacity of the land, in somewhat the same way as the *Parkinsonia* tree has done in various parts of Western Queensland. The dry scrubs in the Central district, as those in the neighbourhood of Rockhampton, are also places where the tree might possibly get a hold in somewhat the same way as the lantana already has in many places.

"It is comforting to know, however, that the tree has been in Queensland for a number of years without showing signs of becoming a pest in any way, for seeds were first introduced in 1877 and the tree was bearing pods at Kamerunga State Nursery over twenty years ago. On the whole, the advantages derived from the tree would appear to outweigh the disadvantages, but it would be as well to keep a sharp lookout to see that the tree is not spreading too rapidly, to the detriment of better vegetation.

"In planting trees for fodder for use in times of drought we have, in my opinion, in many native sorts species better than the imported, as, for instance, the kurrajong (*Brachychiton populneum*), red ash (*Alphitonia excelsa*), Mulga (*Acacia aneura*), cattle bush (*Pittosporum phillyræoides*), supple jack (*Ventilago viminalis*) and others. The value of these trees should not be overlooked in any scheme of planting trees as emergency feed in times of drought."

CUTWORMS.

By N. A. R. POLLOCK, Northern Instructor in Agriculture.

In experimenting in disease control with tomato plants at Bowen, part of the treatment was to dip the roots and stems of the plant, after lifting from the seed bed in a solution of 1 part sulphate copper (bluestone) to 500 parts water (a heaped teaspoonful of the powdered bluestone to 3 pints of water is near enough). It was noticed that while plants set out without this treatment were often lost by being eaten off at the ground by cutworms or other insects, no instance was noticed of attack being made on a treated plant. Possibly this experience may be of value to growers who suffer loss when setting out other plants..

It is important to keep the leaves free from the solution.

REINFORCED CONCRETE TANKS.

For the article appearing on pages 267-270, the specifications and plans were prepared and courteously supplied by officers of the Department of Public Works, Brisbane, in response to a subscriber's request referred to them.

COTTON.

By H. C. QUODLING, Director of Agriculture.

Cotton is not by any means a new crop to Queensland. Its cultivation commenced here in 1860, and ten years later the area cropped had increased from fourteen to upwards of fourteen thousand acres. The origin of cultivation and this increase was brought about by two contributory causes—a bonus on cotton, and an extraordinary demand due to the American Civil War. The re-appearance of American cotton in the European market on the conclusion of the Civil War, and the difficulty in those days of communication with Europe were the principal factors in a decline in the area cultivated, and which continued until 1887.

The industry was resuscitated soon after and manufacturing undertaken on two separate occasions at Ipswich, but operations in this direction were not at any time very extensive. Cessation on the last occasion was due to competition from abroad, there being no protective duty.

Low prices over a term of years acted as a check to development. Added interest was shown in the crop in 1903, and in 1913 the Government made an advance of 1½d. per lb. on seed cotton and ginned it on owner's account, the final return being equal to about 1½d. per lb. The system of making advances to farmers has since been continued. Last year, and again this year, the advance was 5½d. per lb., and the same rate will be maintained until 30th June, 1923.

The present Government has throughout shown great interest in the cultivation of cotton, and the advance of 5½d. per lb. is due to their desire to encourage the farmers to cultivate this crop with the sure knowledge of a market, thus establishing the industry.

Extraordinary interest is now shown in the crop, which has proved most remunerative; in fact, many farmers now engaged in cotton-growing had not hitherto been so prosperous.

The active participation by the Australian Cotton Growing Association (Queensland), which has established modern ginning plants at Rockhampton and Brisbane (Whinstanes), has also contributed to the flourishing condition of the industry. An assured price of this character, even should it be regulated at a later date, according to a sliding scale consistent with varying qualities of cotton, is calculated to do much towards the extension of what promises to be a very important industry to Queensland. The 1921-22 crop promises to exceed a total of 1,500 tons of cotton in seed, and a big increase is expected for 1922-23.

Efforts are being directed by the Department towards the introduction into cultivation of improved long staple Upland varieties, with a view to the production of cotton which will return a good aggregate yield, and command also the highest possible price obtainable.

A sub-tropical climate, copious rains in the spring and early summer, followed by a dry autumn, are favourable conditions for the development of the cotton plant.

Upland cotton should be grown as an annual crop and in rotation, wherever possible, with other suitable crops.

DIRECTIONS FOR PLANTING UPLAND COTTON.

Cosmopolitan Character of Plant.—Under favourable climatic conditions cotton will thrive on a great variety of soils. A naturally well drained soil should be chosen.

Drought Resistant Habit.—The plant is a deep rooter and naturally drought resistant once it is firmly established, but responds to good cultivation, and will return heavier crops on cultivated land where the surface soil has been thoroughly prepared some months beforehand, and moisture stored up in the sub-soil and conserved by regular cultivation for the use of the growing crop.

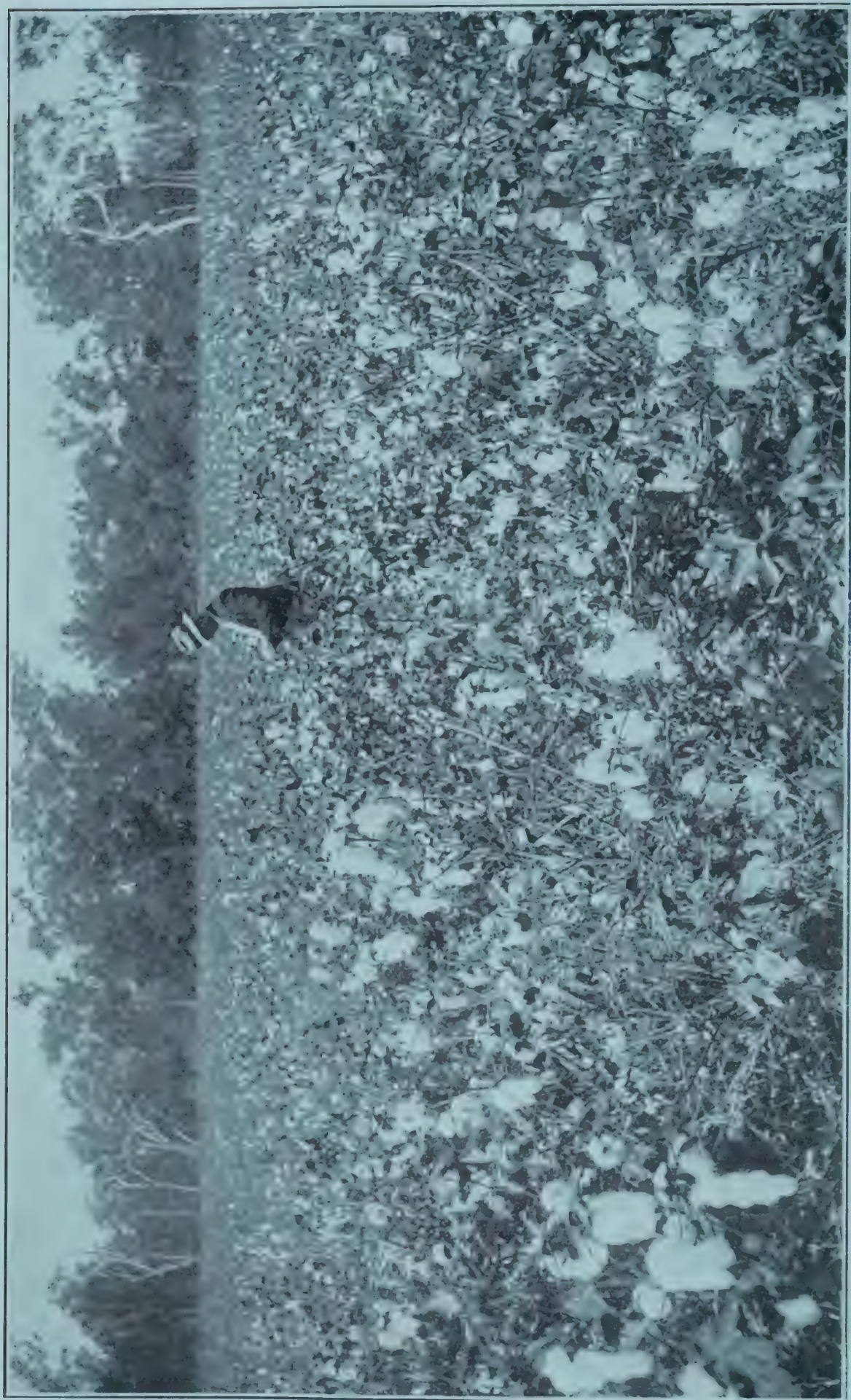


PLATE 56.—CROP ON MESSRS. IRELAND'S PLANTATION, ALMA CREEK, DAWSON VALLEY.



PLATE 57.—COTTON CROP ON MR. J. L. W. JENSEN'S FARM, WOWAN, DAWSON VALLEY.—FIVE ACRES PRODUCED TWO TONS
AT THE FIRST PICKING.

Well Prepared Land Essential.—Land that is ploughed and cross-ploughed, not necessarily deep, say to a depth of six or seven inches, should be worked up to a good tilth on the surface prior to the seed being sown. In this way germination is assisted, and a supply of plant food made readily available.

A Good Crop for Scrub Land.—Cotton is a suitable crop for and thrives well on recently burnt off scrub land, amongst the stumps and unburnt logs, the seed either being planted by hand in a shallow depression, not more than an inch and a-half deep, made and covered in again with a hoe, or else put in with an ordinary maize “hand planter.”

Where practicable, parallel dray tracks should be cleared at intervals, say every two chains, throughout the field, to facilitate the removal of the picked cotton at harvest time, the stumps along the tracks being cut off close to the surface of the ground to facilitate the passage of dray or other conveyance used.

Judgment should be used when planting seed to keep it in fairly straight lines or rows, which may vary in width, say between 4 and 5 ft. apart, according to the conditions under which the cotton is grown. The seed is customarily sown in closely spaced hills 15 to 20 in. apart along these rows, two or three seeds to a hill, thinning to a single, strong, vigorous plant when the plants attain a height of about 6 to 8 in.

Where the surface is rough, or encumbered with logs or stones, wider and more irregular spacing of hills is necessary; allowance being made in this instance for plant development and room to move amongst the plants at harvest time.

On the other hand, where there has been a clean burn, close and continuous planting is permissible, in order to approximate the final distances apart of plants aimed at, when cotton is grown on cultivated land.

The Cotton Crop as an Adjunct to Dairying on Scrub Land.—Where recently burnt off scrub lands are required soon afterwards for dairying purposes, cotton may be grown, under favourable conditions, as a primary crop, and Rhodes grass seed sown, say at the rate of 4 to 5 lb. per acre, throughout the growing crop, when the young cotton plants are established. Planting of the grass seed should be regulated to fit in with the wet season, and to allow time for the grass to establish itself before the winter. If sown too early, the grass would smother up the cotton plants, and tend to reduce the yield of cotton.

Amount of Seed per acre and Distances between Rows on Cultivated Land.—About 10 lb. of seed are sufficient for an acre, when care is exercised in planting. Rapid and economical planting is assured by the use of a two-row maize or cotton planter.

Rows 4 feet Apart.—This is a fair average distance between the rows, but this width should be increased under special circumstances, as described. Where a single-horse maize drill is used for planting the seed, very light furrows may be run out 4 ft. apart with the plough and the seed drilled in the furrows; or *preferably* a marker may be used, marking three rows at a time, as a guide when sowing for the person who uses the drill. Prompt harrowing immediately after either of these operations is necessary.

Rows 4 feet 6 inches Apart.—On good agricultural land, where vigorous growth is expected, the rows may be 4 ft. 6 in. apart, and the plants left to stand 12 to 15 in. apart in the rows.

Rows 5 feet Apart.—When arranging for planting on rich land, where forcing conditions may be expected during growth, an allowance must be made for the extra size attained by the plants. Here the rows may be 5 ft. apart, but the plants should be crowded in the rows and left at from 12 to 15 in. apart at the final thinning.

After Cultivation.—Early and constant use of the horse hoe (the later the cultivation the shallower it should be) is necessary to keep the weeds down, and the soil in a well aerated condition. In this way the plants can be carried over any dry spells.

On Scrub Land.—The use of the hand hoe on scrub areas will also be conducive to heavier yields and healthier crops.

Distances between Plants in the Row.—Judgment is to be used in all plant spacing. A good average planting space between the single seeds and the young plants grown therefrom is from 8 to 10 in. It is necessary, however, to thin these out when they are several inches high.

In dry districts, one strong plant should be left at intervals of from 15 to 20 in. Emphasis is placed on the fact that on rich soil, when the season is good, plants require to be kept close together in the rows, say 12 to 15 in. apart.

In Upland cotton, if the spaces between the plants in the rows are at all wide it induces the formation of “vegetative” (woody) branches to the detriment of the “flowering” (bud and boll bearing) branches, and a consequent reduction in cropping capacity.



PLATE 58.—COTTON CROP (20 ACRES) ON MR. L. SMITH'S FARM, DULULU, DAWSON VALLEY LINE.

Yield.—1,200 lb. per acre to date (picking not complete).



PLATE 59.—DRYING THE COTTON, BEFORE BALING, ON MR. L. SMITH'S FARM, DULULU, DAWSON VALLEY LINE.



PLATE 60.—DRYING THE MORNING PICKING ON MR. C. G. YOUNG'S FARM, DEEFORD, DAWSON VALLEY.



PLATE 61.—BALING COTTON AT MR. C. G. YOUNG'S FARM, DEEFORD, DAWSON VALLEY LINE.

(Note improvised dumping appliance).



PLATE 62.—COTTON FIELD ON MR. C. H. CHOWN'S FARM, WOWAN, DAWSON VALLEY.
Miss. Chown made the record picking of 170 lb. seed cotton in one day.



PLATE 63.—REFRESHMENTS IN "DIXIE" LAND—MR. H. WENCKE'S FARM,
MYRTLEVALE, WOWAN, DAWSON VALLEY LINE.

Treatment of Seed.—Owing to the short fluffy fibres adhering to the seed, it must be treated prior to attempting to pass it through a drill or maize hand planter. Puddled clay or flour paste is commonly used for this purpose. Seed is dipped, in small quantities, into a vessel containing either of the above mixtures, the best consistency for which is readily ascertainable by a little practice. That treated with puddled clay should be rolled by hand on a sieve or other suitable surface, and the seeds made up to resemble small marbles, which must be allowed to dry out in the sun; when drying out, careful handling is necessary.

The flour paste treated seed is dipped into the prepared paste, drained, and well squeezed, but care should be taken at once to prevent the seeds sticking together. Ashes are useful in this latter respect, but the seeds should be carefully separated and dried out on bags or on a tarpaulin to ensure their regular and easy passage through the seed drill.

The fluff on the seed may also be singed. For this purpose a dry hollow log 3 to 4 ft. in length is stood up on iron bars over a tub of water. The inside of the log is fired, and the seed dropped through in a thin stream from the top directly into the tub of water, and dried out immediately after, so as to be ready for use.

Time to Plant and Period of Maturity.—Other things being favourable, the time for planting seed varies according to climatic conditions ruling in any particular district, and planting may be carried out as soon as danger from frost is over, up to October, and in some localities to mid-December. Under satisfactory growing conditions the first flower buds appear when the plant is about forty days old. It takes about another thirty days for the flower to expand. The flower remains open for about three or four days and drops off, changing to a richer colour before doing so. The boll increases in size for about fifty or sixty days, and then bursts open, through the growth of the cotton lint enveloping the seed. Development and expansion of the fibres follow on in natural sequence until the full, fluffy boll of lint completes the process of development of the cotton.

It is inadvisable for a crop to mature during the summer rainy season. The dry, fine, hot weather customarily following on immediately after this period is the best kind of weather for the plant to complete the bearing and maturity of its crop of cotton. Obviously, soils which are of a loamy or of a sandy loam character, and are of good capillarity, will not suffer so much from dry weather as those which are liable to crack or fissure. It is at this late period in the life of the growing plant that reserve supplies of soil and subsoil moisture are drawn upon in order to fully develop its crop.

On good, rich agricultural land, in moist, warm weather, the cotton plant has an inclination to make rather too much growth.

Ordinarily, the crop takes from four to four and a-half months to mature. As the whole of the bolls do not ripen at once, it is necessary to allow the main crop to fully ripen and develop and the bolls to open well before attempting to pick. A second and possibly a third picking may be necessary to ensure the harvesting of the full crop.

* *Harvesting.*—Picking should not commence until the dew has completely dried off the cotton. Cotton picked in the morning should be exposed to full sunlight for some hours before baling, to thoroughly dry it out.

The strictest care should be exercised to keep the seed cotton free from leaves, sticks, dirt, or foreign matter of any description, and stained or discoloured cotton, unripe and dead locks; should not be mixed with the clean, sound, marketable sample.

Clean bales should preferably be used for the reception of the crop. These require to be legibly branded before despatch to their destination—the Australian Cotton Growing Association's Ginners, either at Whinstanes, near Brisbane, or Rockhampton, whichever is the nearer.

AMERICAN TYPE OF COTTON PICKING BAG.

The cotton picking bag illustrated is in general use in American cotton fields, and it is recommended by the Australian Cotton Growing Association. The bag is 6 feet deep with one side extended to form an apron to rest against the user's body and to provide a rubbing surface when pushing the cotton down into the mouth of the bag.

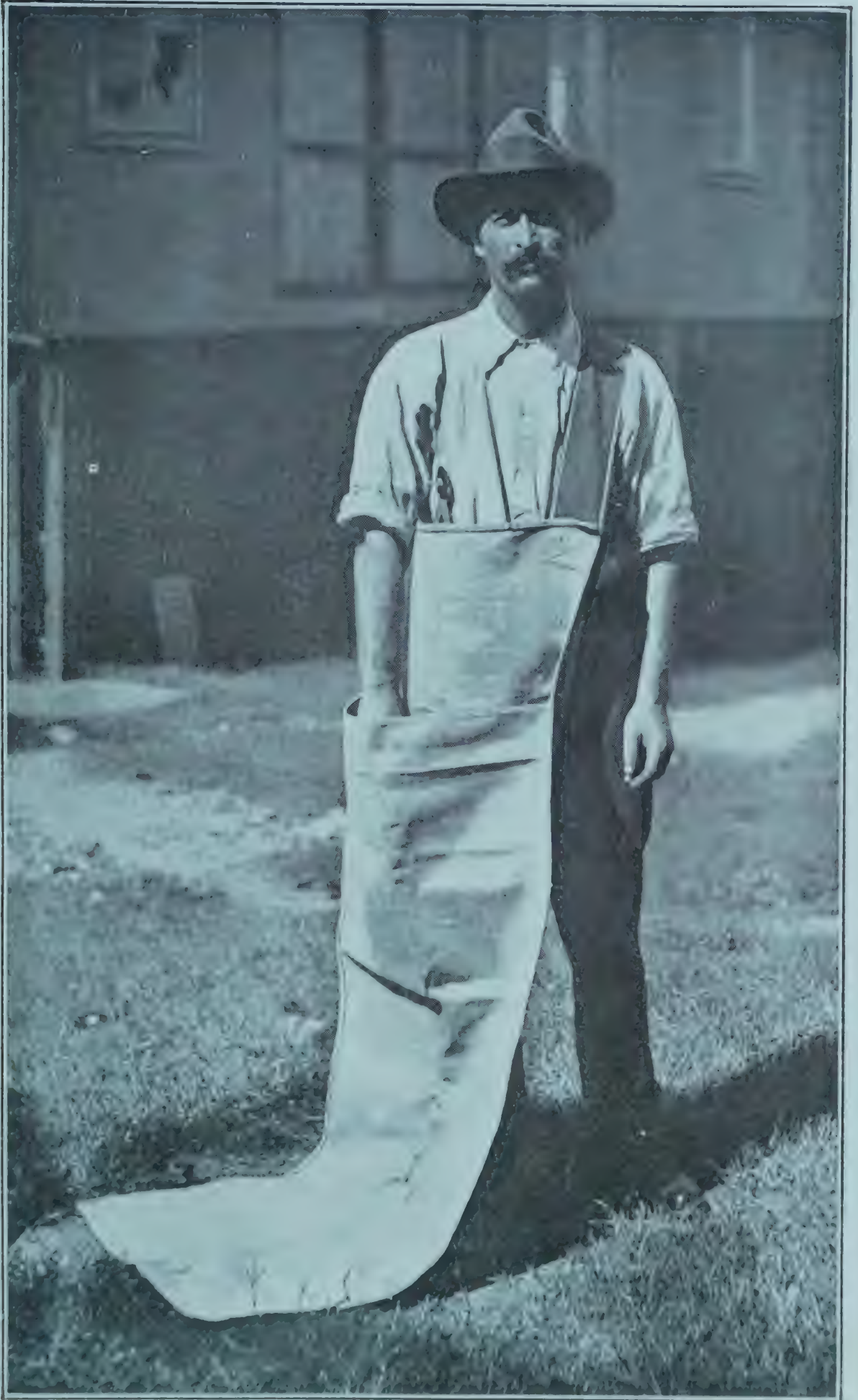


PLATE 64.—A COTTON-PICKING BAG.

UPPER BROOKFIELD.

By J. MITCHELL, Instructor in Fruit Culture.

How few Brisbane people there are who know of the existence almost at their doors of Upper Brookfield; its wealth of natural beauty and its material wealth hidden, and, seemingly, as yet unbidden, in its practically untilled soil. Within a few miles of the Brisbane G.P.O. is a stretch of country that is a delight to the eye of the Nature lover, a happy hunting-ground of the naturalist, a glory of virgin woodland, a land of golden promise slowly emerging from the primitive to the practical. Fertile valleys checked in green and brown with growing crops and furrowed fields, silver-threaded with crystal streams, and sheltered by ranges ribbed with densely forested buttresses—all this is Upper Brookfield. It would seem that Nature herself planned this beautiful locality for one great garden, and, though within the traffic roar of a great metropolis, to-day only the staccato tap of a settler's axe or the call of a bird to its mate awakens echoes down along its scrub shaded silences.

Soil Fertility.—The land in the Upper Brookfield area is very fertile, and with proper cultivation it would grow many varieties of fruit. The country already cleared for dairying is rather too open for successful banana culture, but large areas of standing scrub sheltered by the range and of suitable soil and aspect should provide successful plantations.

Cultivation and Settlement.—Among the newer settlers are several returned soldiers, who have already made great headway on their holdings. Among these are Messrs. F. Midgely, Jos. Soper, and A. D. Gillies. Right at the head of a creek in a crescent-shaped pocket is the plantation; admirably situated and sheltered is the plantation of the last-named, and one of the snuggest and best-worked little properties in the district. Mr. Gillies is a believer in intense cultivation, and he keeps his banana plants on the single-corm system. In no case are more than two followers allowed at the right time—that is, when the parent plant is allowed to throw its bunch. The area has been planted 12 ft. by 12 ft. Where the land is so fertile, with a sufficiency of humus, it might be advantageous to plant one sucker between each two plants in one row, thus making the plantation 12 ft. between the rows and 6 ft. in the row. The 6-ft. rows should be across the hillside, where washaways are likely to occur. All decaying stalks and leaves might be supplied as manure to this row. In selecting suckers as followers, it would be wise to leave the young plant on the upper or hillside. To keep the plants their proper depth in the soil, when suckering or pruning, the bulb should be disconnected from the parent plant. Planters in this locality would be well advised to cut out the maiden plants in the course of July or August that are likely to produce what are called November bunches. This practice will foster good suckers giving a bunch ready for the winter cut.

Accessibility.—With a personal equation among its settlers of high value, backed by fertility and climate, Upper Brookfield is bound to come into its own, but its immediate progress is retarded by its primitive roads. The settlers declare that all they require is a main road to be constructed by the Main Roads Board. The settlement would thus be brought within an hour of metropolitan markets by motor lorry. With such a fertile and productive area at the door of the city, apart from the tourist value of such a road, it should not be long before their very reasonable hope is realised.

AUSTRALIAN MEAT FOR BRITISH ARMY AND NAVY.

In England recently Mr. Jowett, M.P., expressed surprise that the Imperial Government contracts for the supply of navy and army with Argentine frozen beef were still in existence. He point out also that an arrangement existed for certain Argentine meatworks to be run on the Board of Trade account, thus shutting out Australian beef from army and navy contracts. Mr. Jowett directed attention to this injustice to Australian producers, and was informed that the British army contracts now running will cease after 30th June. After that date the army will be prepared to take Australian meat. In this connection Queensland houses have been asked by the importers of Queensland beef in London to reduce freezing charges by one-eighth of a penny a pound, this reduction to be made unconditionally, and to facilitate the reduction of freight charges and other Australian costs.



PLATE 65.—BANANAS GROWN BY A SOLDIER SELECTOR, BROOKFIELD, NEAR
BRISBANE.



PLATE 66.—A SOLDIER SELECTOR'S HOMESTEAD ON BANANA PLANTATION,
BROOKFIELD.



PLATE 67.—BANANA-GROWING ON MR. GILLIES' SELECTION, BROOKFIELD.



PLATE 68.—BANANA PLANTATION ON MR. GILLIES' SELECTION, BROOKFIELD.



PLATE 69.—BANANAS ON A SOLDIER'S SELECTION, BROOKFIELD.



PLATE 70.—YOUNG PLANTATION ON A SOLDIER'S SELECTION, BROOKFIELD.

TREATMENT FOR STOMACH WORMS IN SHEEP.

Mr. J. Legg, B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon, Townsville, writes:—

“I am in receipt of a report concerning treatment of stomach worm in sheep, which was kindly forwarded to me from South Africa by the Director of Veterinary Research, and, among other things, it contains some valuable information concerning the treatment of stomach worms in the sheep.

“Comparisons were made between various drugs and combinations of drugs, regarding their efficacy in removing the stomach worm from sheep or heavily infested animals, and it was found that a combination of copper sulphate and sodium arsenite was not only superior to any other drug, but was superior to any other of the arsenic compounds.

“This combination was found in most instances to remove 100 per cent. of stomach worms, even in those cases where gross infestation had been invoked by artificial means.

“The drugs are used in the powder form, and each dose is placed on the back of the tongue by means of an ordinary teaspoon. The operator simply opens the mouth of the sheep and places the dose on the back of the tongue with the spoon. A large number of doses can, of course, be made up in bulk, and a series of small spoons are used in administration, each spoon when full to the rim holding the required dose. One man carries the mixture in a bowl, and with the spoon picks up the required dose and places it in the teaspoon held by the operator who doses the sheep. In this way it is found that a large number of sheep are quickly dosed.

“Doses are as follows:—

Age of Lamb.	Sodium Arsenite.	Bluestone.
2 to 4 months	$\frac{1}{2}$ gr. = 36 m g = .555552 gr.	$2\frac{1}{4}$ gr. = 144 m.g. = 2.222208 gr.
4 to 6 months	$\frac{3}{4}$ gr. = 50 m.g. = .7716 gr.	3 gr. = 200 m.g. = 3.0864 gr.
6 to 10 months	$1\frac{1}{6}$ gr. = 75 m.g. = 1.1574 gr.	$4\frac{3}{4}$ gr. = 300 m.g. = 4.6296 gr.
2 tooth ..	$1\frac{1}{2}$ gr. = 100 m.g. = 1.05432 gr.	6 gr. = 400 m.g. = 6.1728 gr.
4 tooth ..	2 gr. = 125 m.g. = 1.929 gr.	$7\frac{3}{4}$ gr. = 500 m.g. = 7.716 gr.

M.g. means milligrams.”

AN EXTENSIVE FARMER.

Accompanying the Empire Exhibition delegation is Mr. F. Hiam, a member of the National Institute of Agricultural Botany (U.K.), and probably the most extensive farmer in England. He has about 7,000 acres under cultivation in Norfolk and Suffolk, with his headquarters at Cambridge, from which there is a system of telephonic communication with the various portions of his estates. His remarks in the course of a Press interview will interest Queensland farmers, throwing as they do a sharp light on methods of farm management in the United Kingdom, the efficiency of which so impressed members of the A.I.F. who took advantage of the opportunities provided for them under the A.I.F. educational scheme to study at first hand farming practice in the old country. Speaking of his work Mr. Hiam said:—

“An early start is necessary, as sometimes orders arrive, say, for the immediate delivery of 100 tons of potatoes. My farms are in two blocks, which are 10 miles apart, and these are served by a light line of railway. Each block comprises a group of farms containing 300 acres, and each farm is in charge of a bailiff, and there is again a chief bailiff in control of every 3,000 acres, and a head bailiff supervises the whole staff. I go in extensively for the cultivation of potatoes. My annual crop is generally about 2,300 tons, and I sometimes plant the same land for two or three years in succession with tubers, and then sow the land with wheat. There is no need to plough the ground for the wheat crop, and the seed is merely harrowed in. The potato land is ploughed from 10 in. to 1 ft. deep, three horses being used for every single-furrow plough. I tried tractors, and scrapped them, as I consider horses a much cheaper proposition. Altogether I have used ten different kinds of tractors, which cost on an average £750 apiece, and after working for four years I could not get £50 each for them. I follow the wheat crop again to a great extent with potatoes, and the seed comes from Scotland, where I produce 2,000 tons of seed potatoes annually. These potatoes are produced profitably at 30s. a ton, and are the best in the world for seed purposes, a very large quantity being exported every year to America.

A SUMMARY OF EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS, FROM 1902.—II.

By H. T. EASTERBY, General Superintendent.

The first article of this series, in the course of which Mr. Easterby discussed deep cultivation experiments and tabulated comparative crop results from subsoiled and non-subsoiled fields, was published in the May Journal. The second instalment is an account of the results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices.—Ed.

EXPERIMENTS WITH IRRIGATION.

The principal experiments with irrigation for cane crops were carried out at the Mackay Sugar Experiment Station from 1905 to 1909. The question was approached from two sides. On the one hand tests were made in order to show what deep, thorough, and subsoil cultivation will do in the matter of aiding the crop or crops to resist the action of drought, and in avoiding the cost of resort to irrigation. On the other hand irrigation was practised to demonstrate its actual net value over a reliance upon rainfall. The results of the irrigation and cultivation experiments go to show that while irrigation will be found to have a high economic value where the water can be obtained and applied at low cost, yet deep, subsoil cultivation, advisable in all conditions with or without irrigation, will enable crops to be grown economically in locations where irrigation is not practicable and where the annual rainfall is fairly good. In the application of water to the cane crop there are two chief modes of distribution. The one, which may be called the Hawaiian method, consists in applying the water to the cane in deep furrows, the furrows being intersected or cut up into short lengths of 20, 30, or 40 ft. By the other method the water is applied in channels between the cane rows, and runs whatever distance is determined upon, which is often from one end of the field to the other. By the latter method there is no such thing possible as an even distribution over all the land, and it is possible to cause great damage to areas where the water can accumulate and stagnate, or where it leaches too freely through into the subsoil, carrying soluble soil elements with it. The application of water to the cane in deep, short furrows is the method securing the maximum value of the water at the highest cost of labour. Irrigation in channels between the rows of cane involves the greatest expenditure and waste of water, with a minimum cost of labour in application, and at the greatest risk of damage to the soil. Both these methods of applying water are largely controlled by the nature of the soil and its subsoil.

The water used for irrigation at the Mackay Station was obtained from an underground running supply, which is believed to underlie large areas of the Mackay delta. By putting down a bore to a depth of 64 ft. below the surface of the station field, and to 20 ft. below the sea level, an abundant supply of sweet water was found. Water was found at 18 ft., at 40 ft., and at 64 ft., whence it was finally obtained, the pressure raising the supply 36 ft. up the pipe. There are, doubtless, other water-bearing strata at lower depths. The water was pumped up into raised tanks. Every gallon of water used in the experimental irrigation tests was measured and applied direct from the tanks.

The irrigation experiments mentioned above were carried out under the following four sets of conditions:—

1. Irrigation, mixed manures; all other conditions of cultivation being equal.
2. Irrigation, no manures; all other conditions of cultivation being equal.
3. No irrigation, mixed manures; all other conditions of cultivation being equal.
4. No irrigation, no manures; all other conditions of cultivation being equal.

These experiments were planted in April, 1905, upon uniform land, and in a soil of uniform depth and composition.

The cultivation was the same upon all the plots within the series, and comprised the following acts:—The ground was ploughed to an actual depth of 12 in.; after the plough the subsoiler went to a further depth of 8 in., thus furnishing a depth of loose soil of not less than 20 in. Three cross-ploughings followed at intervals of not more than four weeks. The final result of all the preparatory cultivation was that the soil was in the condition of a fine loose tilth to the depth already stated.

The cane on all these comparative test plots was planted as follows:—Sets with three eyes were planted 6 in. apart in the row, and covered with a depth of 3 in. of soil. The rows in all these experiments were exactly measured and were 5 ft. apart.

The planting was immediately followed by heavy rains lasting over a month, and then by very cold dry weather, which checked the germination and growth of the cane.

The remaining six months of 1905 were the driest recorded for some years, only 7 in. of rain falling in the whole of that time. This dry spell enabled the irrigated plots to take and maintain the lead, and the tables of results, in a later place, will indicate that the initial effect of these climatic conditions have had a controlling influence on the final crop results, particularly in the case of the non-irrigated plots.

RESULTS OF THE PLANT CROP, 1906.

The action of irrigated water and manures upon the chemical composition of the juice is shown in the following table:—

Conditions.	Average Density of Juice (Brix.)	Average Sucrose in Juice.	Average Quotient of Purity.
Irrigated plots: Mixed manures ..	19.15	17.409	90.90
Irrigated plots: No manures	19.43	17.837	91.80
Non-irrigated plots: Mixed manures ..	18.86	17.295	91.70
Non-irrigated plots: No manures ..	19.49	18.219	93.47

With reference to this table it is indicated—First, that irrigation, which means a maximum or some excess of moisture, has tended to lower the purity of the juice; second, it is also indicated, both upon the irrigated and non-irrigated plots, that the manures while increasing the production of cane tend to a slight depreciation in the purity of the juice. This result is in agreement with the results at other experiment stations. These results, however, are not without exceptions, for, upon land which has become thoroughly exhausted by long and continuous cropping, the application of a mixed manure very frequently results in an improvement of the quality of the juice as well as in the yield of cane per acre.

A summary table is now furnished which presents the results from the plant crop obtained under the four sets of conditions, already explained, in a ready form for general oversight. These summary results show that, upon the irrigated plots, the manures resulted in an additional yield of $4\frac{1}{2}$ tons of cane, and of half a ton of sugar, to the acre. Upon the non-irrigated plots, while the manures gave an additional yield of $3\frac{1}{2}$ tons of cane to the acre, the increase in the sugar per acre was very small.

SUMMARY TABLE.

Conditions.	Weight of cane per Acre in English tons.	Yield of Sugar pe Acre in English tons.
Irrigated plots: Mixed manures, other conditions of cultivation being equal	58.4	9.1
Irrigated plots: No manures, other conditions of cultivation being equal	54.1	8.6
Non-irrigated plots: Mixed manures, other conditions of cultivation being equal	50.7	7.7
Non-irrigated plots: No manures, other conditions of cultivation being equal	47.4	7.6

In considering the action of the manures it has to be repeated that all of the plots now under consideration not only were subjected to deep ploughing, subsoiling, and a very thorough preparation by repeated cross-ploughings, but the whole of the land received the application of something over 2 tons of burnt lime per acre. This deep and thorough cultivation, with the lime, would cause a large proportion of the chemical plant food elements to be brought into a soluble and available condition for the use of the crop. These effects would therefore proportionately tend to lessen the special action of the manures, and to reduce the difference in the results between the manured and unmanured plots. As a matter of fact, large results were not expected in the plant crop from the manures; but it was expected that the same manures would give a larger account of themselves upon the several succeeding ratoon crops.

RESULTS FROM FIRST RATOON CROP OF ABOVE EXPERIMENTS, 1907.

The action of irrigation and manures upon the density and purity of the sugar juices is set out in the table following, where it is seen that the indications pointed out in the plant crop have been again repeated—namely, that irrigation and manures have a tendency, while increasing the yield, to lower the purity of the juices.

THE ACTION OF IRRIGATION AND MANURES UPON THE DENSITY AND PURITY OF SUGAR JUICES.

Conditions.	Average Density of Juice (Brix.)	Average Sucrose in Juice.	Average Quotient of Purity.
Irrigated plots: Mixed manures ..	20.0	18.18	90.9
Irrigated plots: No manures	20.5	19.06	92.9
Non-irrigated plots: Mixed manures ..	19.5	17.63	90.4
Non-irrigated plots: No manures ..	20.6	19.53	94.8

The summary table following presents the average results obtained from the plots under the four sets of conditions. It is shown that the irrigated plots with manures gave a slightly lower result than the corresponding non-irrigated plots with manures; while the irrigated plots with no manures gave a slightly higher result than the corresponding non-irrigated plots with no manures. The irrigated plots with manures show an increase of 9.3 tons of cane per acre and 1.3 tons of sugar over the irrigated plots with no manures; and the non-irrigated plots with manures show an increase of 10.7 tons of cane and 1.2 tons of sugar per acre over the non-irrigated plots with no manures.

SUMMARY TABLE.

Average of Results from the First Ratoons under the Four Sets of Conditions set forth.

Conditions.	Weight of Cane per Acre in English tons.	Yield of Sugar per Acre in English tons.
Irrigated plots: Mixed manures, other conditions of cultivation being equal	41.9	6.8
Irrigated plots: No manures, other conditions of cultivation being equal	32.6	5.4
Non-irrigated plots: Mixed manures, other conditions of cultivation being equal	42.4	6.7
Non-irrigated plots: No manures, other conditions of cultivation being equal	31.7	5.4

In comparing the results from the first ratoon crop with those obtained from the plant crop last year, it must be remembered we are now dealing with a ten and a-half months' crop, the plant crop being seventeen months old at time of harvest.

RESULTS FROM SECOND RATOON CROP, 1908.

SUMMARY TABLE.

Average of Results from the Second Ratoons under the Four Sets of Conditions.

Conditions.	Weight of Cane per Acre in English tons.	Yield of sugar per Acre in English tons.
Irrigated plots: Mixed manures, other conditions of cultivation being equal	39.5	6.3
Irrigated plots: No manures, other conditions of cultivation being equal	24.0	3.9
Non-irrigated plots: Mixed manures, other conditions of cultivation being equal	38.8	6.1
Non-irrigated plots: No manures, other conditions of cultivation being equal	24.1	4.0

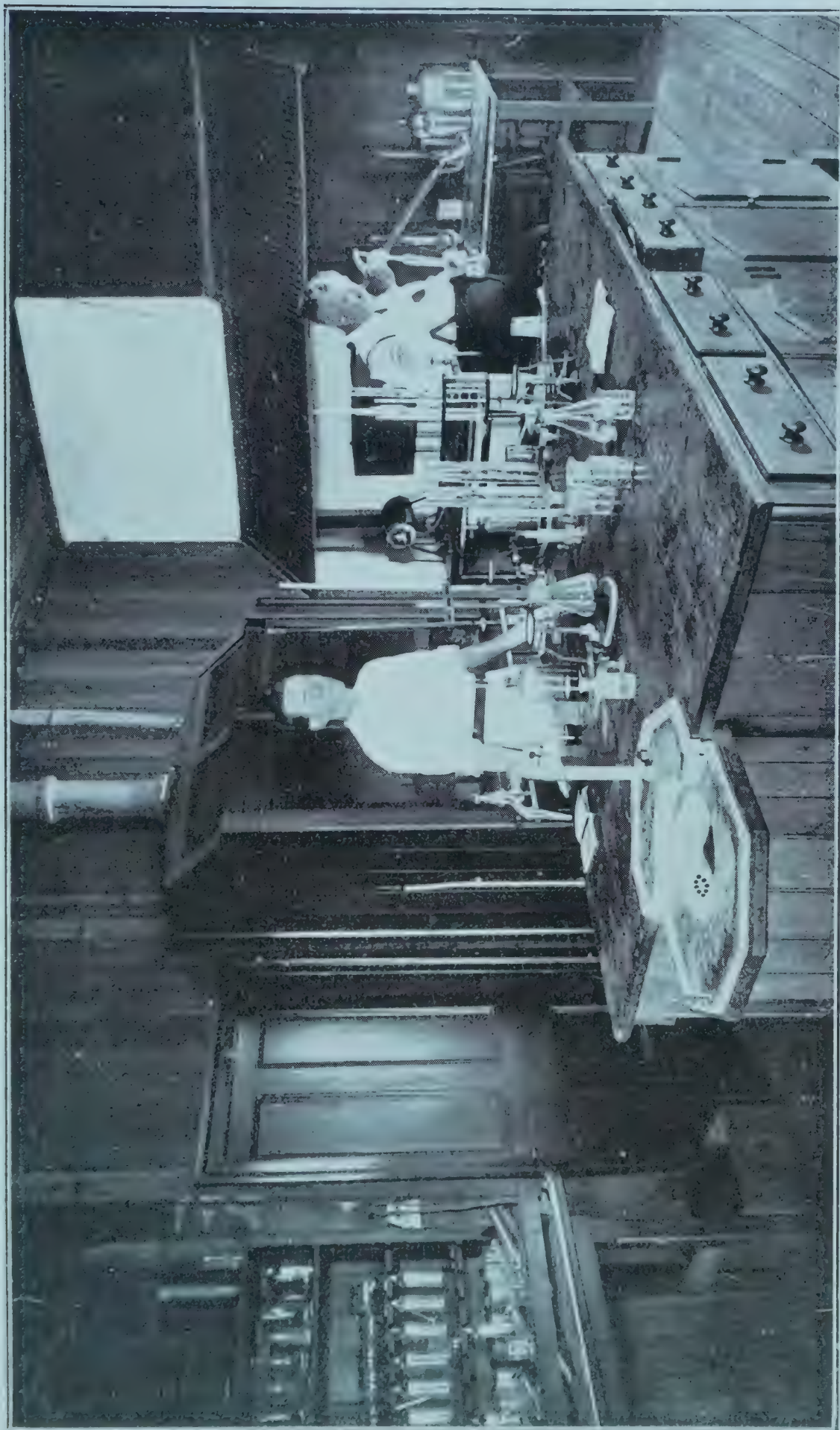


PLATE 71. INTERIOR OF LABORATORY, SUGAR EXPERIMENT STATION, MACKAY.

The irrigated plots with manures in the second ratoon crop have given a slightly higher yield over the non-irrigated plots with manures, the difference being equivalent to 14 cwt. more cane per acre. On the other hand, the irrigated plots without manures give a very slightly lower result when compared with the non-irrigated plots without manures, the difference in favour of the latter being 2 cwt. more cane per acre. The irrigated plots with manures show an increase of $15\frac{1}{2}$ tons of cane per acre and 2.4 tons of sugar per acre over the irrigated plots with no manures, while the non-irrigated plots with manures, show an increase of 14.7 tons of cane per acre and 2.1 tons of sugar per acre over the non-irrigated plots without manures.

RESULTS FROM THIRD RATOON CROP, 1909.

SUMMARY TABLE.

Average of Results from the Third Ratoons under the Four Sets of Conditions.

Conditions.	Weight of cane per Acre in English tons.	Yield of Sugar per Acre in English tons.
Irrigated plots: Mixed manures, other conditions of cultivation being equal	35.13	5.86
Irrigated plots: No manures, other conditions of cultivation being equal	19.63	3.32
Non-irrigated plots: Mixed manures, other conditions of cultivation being equal	35.95	5.91
Non-irrigated plots: No manures, other conditions of cultivation being equal	19.86	3.26

In these and other experiments with irrigation it was conclusively proved that in normal years at Mackay, with a fair rainfall, good deep cultivation will give as good results as are to be obtained with irrigation. Of course, it need not be said that in dry years irrigation greatly increases the crop, but as many Northern sugar districts only get one or two dry years out of ten it is very questionable whether the installation of an irrigation plant would pay outside of the Lower Burdekin and some of the Southern districts. The finest results from irrigation are always obtained in places where the average rainfall is low.

The methods of cultivation of the ratoons upon the non-irrigated plots were as under:—

The middles were split open with the swing plough, followed by the subsoiler to a depth of 18 in. Those furrows next the cane were then ploughed away from the rows and similarly subsoiled, thus ensuring all ground between the rows being thoroughly moved and subsoiled. The mixed fertilisers were then applied to those plots which were to be fertilised, in the furrow next to the cane, which were then closed by the plough, this act also taking place with the plough on the non-manured plots, so as to secure uniformity of cultivation. The Planet Junior cultivator, fitted with broad hoes, was then run over all the ground between the stoles to level same down, and this implement was used for subsequent shallow cultivations while the cane was young.

On the irrigated plots no cultivation with implements took place, but the stole bed was loosened with picks, and the land subsequently kept clean with hand-hoeing while cane was young. Mixed fertilisers were applied to those plots carrying manures.

SUGAR: FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports, 4th May, 1922, as follows:—

In the course of April the districts of Mount Bauple and Bundaberg were inspected.

Mount Bauple.—There is a good showing of cane at Bauple. The crops, however, are just feeling the effects of the dry weather, but as they are generally well forward there is no need to anticipate serious deterioration unless the dry weather persists.

Cane varieties making a good showing are 1900 Seedling, D.1135, Q.1098, Shahjahanpur No. 10, E.K.1, Q.822, Q.813, and H.Q.426 (Clark's Seedling). The three most prominent varieties of these are probably M.1900 Seedling, D.1135, and Q.822. The former is especially doing well and should justify its cultivation on Bauple with more extensive planting.

Tillage of soil is uniformly good, although the texture in places could be improved by green crops. Practically the only cane to show any sign of disease is D.1135. Primary symptoms of striped leaf disease are appearing in patches of cane, and here and there the secondary stage of this disease is in evidence by the cracked and cankered appearance of the stem and the general weakening of the internode. Various kinds of fungi enter these cracks in the stem and destroy the soft tissue, with the result that on windy days the cane breaks off and falls to the ground. Growers should observe this variety carefully, especially in selecting plants.

The best method of plant selection is to survey the cane as it stands, before cutting the plant. Observe the leaf first and make sure the colour is a healthy green and free from rust or stripes. Then let the eye travel down the stem of the cane and observe whether the growth of adventitious roots is excessive, whether the trash is adhesive, and the occurrence of cracks and signs of deterioration in the stem. An experienced observer can, if he bears the foregoing in mind, at a glance form a very fair idea of the quality of the cane he is going to plant.

Fertilising at Mount Bauple is being carried out on a more liberal scale than hitherto. A mixture giving good results to M.1900 Seedling is 200 lb. sulphate of ammonia, 350 lb. superphosphate, and 70 lb. sulphate of potash per acre.

Mount Bauple farmers are taking the keenest interest in sugar-cane culture at the present time, and consider nothing too much trouble if it will benefit their district and assist in reaching that point when the land is producing the maximum. This can be done, however, only by continually improving the texture of the soil, by methodical crop rotation, by careful fertilising, and careful selection of plants and varieties. The district is a good one, but it is as yet producing far below its capacity.

Bundaberg.—Rain is just now wanted in the Bundaberg district. While most of the cane still is considerably resistant to drought, there will be a severe check if rains do not come during May. The Demerara 1135 appears to be suffering most, especially on the higher lands; the broader leafed canes are sheltering the soil better and preventing rapid evaporation. Conditions are not quite so dry on the alluvial loams as on the volcanics, although the degree of fertility is about equal, owing to the better texture of the red soils.

Growers are not being caused much loss at present by parasitic agencies or fungi, although the latter is here and there in evidence on the leaf of D.1135.

Good results are being obtained from meatworks manure on the red soils, while, generally speaking, these are giving negative results on the black loams. Cowpeas and stable refuse are the best manures for the heavier soils, owing to the necessity for improved texture. Excellent results are being obtained on the volcanic soils by rotating maize crops. Bare fallowing should not be done on the porous red loams. Leguminous crops should be grown and ploughed under as a soil-restoring measure.

A 25 per cent. basis would be a good method of working most Woongarra farms at present. That is 25 per cent. plant crop, and the same area of ratoons, standover, and land under renewal process. That would mean that once in four years the whole farm should have been green-cropped with either maize, cowpea, or whatever the grower considered gave the best results.

Varieties doing well at present are E.K.1, E.K.28, Q.813, H.Q.426, 1900 Seedling, Q.1095, Shahjahanpur No. 10, M.189, B.147, Q.1112, H.Q.77, and H.Q.285. The Shahjahanpur is showing considerable resistance to frost. The Shahjahanpur is developing into a good cane, the stick becoming thicker and the trash less adhesive.

Most of the other varieties are fairly well known now to the farmer. The E.K.1 is showing particularly well.

There is a considerable development of canegrowing at Elliot Heads. The soil is a light forest loam, which cultivates and drains satisfactorily. The farmers are doing well and extending and improving their holdings.

This country is well watered and free from frost. The farmers would do well to pay attention to the question of green-cropping.

ORGANISATION OF THE AGRICULTURAL INDUSTRY

The Queensland Producers' Association: How it will be Constituted.

Laying the Foundations for State-wide Rural Co-operation.

Steps have been taken to provide a completely unified national organisation for the Agricultural Industry, in accordance with the scheme of the Premier (Hon. E. G. Theodore), and those steps have led up to the establishment of an Association to be called "The Queensland Producers' Association." This Association is to be open to every producer in Queensland, and will embrace dairymen, fruitgrowers, wheatgrowers, small graziers, sugar producers, and general farmers.

THE QUEENSLAND PRODUCERS' ASSOCIATION.

The Association will consist of a Council of Agriculture, District Councils, and Local Producers' Associations. The Provisional Council already has been constituted, and consists of representatives of the dairying, fruitgrowing, wheatgrowing, sugar-producing, and general farming industries. The representatives of the dairying industry were nominated at a special conference representing all dairying interests, which was held in Brisbane on 24th March, 1922; the representatives of the fruitgrowing industry at the annual meeting of the Southern Queensland Fruitgrowers' Society; the representatives of the sugar industry by the executives of the United Canegrowers' Association and Australian Sugar Producers' Association, and the representatives of the wheatgrowing and general agricultural interests by the State Wheat Board, which is itself a growers' organisation. The Minister for Agriculture (the Hon. W. N. Gillies) is the President of the Council. The objects of the Council are to co-operate with the District Councils, the Local Producers' Associations, the Department of Agriculture and Stock, and other bodies in such matters as:—

- (i.) The development of the rural industries;
- (ii.) Investigating and dealing with problems relating to the rural industries;
- (iii.) Advising agriculturists with regard to matters which require scientific knowledge and training;
- (iv.) Research on subjects pertaining to the rural industries;
- (v.) Securing effective action for the controlling of diseases and pests generally;
- (vi.) The securing of additional markets for the disposal of produce and of improved means of distribution;
- (vii.) The securing of improved means of transport;
- (viii.) The watching of markets and the commercial side of the rural industries generally;
- (ix.) The general policy of standardising;
- (x.) Extending the usefulness of the professional staff of the Department of Agriculture;
- (xi.) Matters in relation to agriculture and production which may be referred to the Council by the Minister;
- (xii.) Generally advising, assisting, and co-operating with the Department of Agriculture in all matters pertaining to the rural industries.

The Council has framed its constitution, and has from amongst its members appointed Standing Committees. These Standing Committees are—

COMMITTEE.	PERSONNEL.
Administrative ..	Messrs. S. G. Howe, F. J. Morgan, G. H. Pritchard, J. Purcell, H. C. Quodling, W. J. Short, and J. D. Story.
Transport ..	Messrs. J. W. Davidson, A. Douglas, A. J. Muir, and W. Ranger.
Dairying	Messrs. A. Douglas, H. McAnally, J. Purcell, W. J. Sloan, and J. T. Tod.
Fruit	Messrs. T. H. Brown, S. G. Howe, W. Ranger, H. I. Ross, and F. M. Ruskin.
Sugar	Messrs. W. G. Batchelor, C. V. Hives, T. A. Powell, G. H. Pritchard, and W. J. Short.
Wheat	Messrs. H. McAnally, F. J. Morgan, A. J. Muir, H. C. Quodling, and R. Swan.

In order that a Standing Committee may get the best technical and expert advisers available, it has been approved that any Standing Committee may associate with it any officer of the Department of Agriculture or other person as the Council may from time to time determine. Persons associated with Standing Committees will act in a consultative capacity but will not have a vote. The duties of the several committees have been allocated as follows:—

- (a) *Administrative*.—To deal with or advise in regard to matters relating to administration, organisation, staff, finance, and generally such matters as are not specifically assigned to other Standing Committees.
- (b) *Transport*.—To deal with or advise in regard to all matters relating to transport, whether by road, rail, steamer, or otherwise.
- (c) *Dairying*.—To deal with or advise in regard to all matters relating to the dairying industry.
- (d) *Fruit*.—To deal with or advise in regard to all matters relating to fruit and vegetable industry.
- (e) *Sugar*.—To deal with or advise in regard to all matters relating to the sugar industry.
- (f) *Wheat*.—To deal with or advise in regard to all matters relating to the wheat industry, and also to such products as maize, cotton, rice, tobacco, &c.

The Council has referred the following matters for consideration as soon as possible by the respective Standing Committees, namely—

(A) Dairying—

1. Production—

- (i.) To devise means of co-operation with the Lands Department regarding the opening-up of suitable lands for dairying purposes;
- (ii.) To advise as to the best fodders to grow, and the best means of fodder and water conservation; need for revival of fodder-conservation campaign in good seasons, and consideration of "silo pool" system;
- (iii.) To advise as to best pure-bred or grade stock available for purchase, &c., and general animal husbandry; assistance in —
- (iv.) To consider the best means of improvement in quality of herds by
 1. Herd testing;
 2. Purchase of stud stock;
 3. Co-operation with private breeders and Herd Book societies.
- (v.) To advise as to the best means of erecting standard dairy buildings, and of the purchase of dairy machinery and utensils.

2. Manufacture—

To advise in relation to—

- (i.) The essentials of production of first-quality milk and cream;
- (ii.) The organisation of suitable transport to factories;
- (iii.) The essentials to be observed universally at factories to ensure uniformity of grade, including instruction to the suppliers of low-grade produce;
- (iv.) The initiation of a uniform system of factory accounts and general factory management, with a view to reducing the cost of production;
- (v.) The most economical method of procuring butter-boxes and other factory requisites.

3. *Marketing*—

To advise in relation to—

- (i.) The best methods of packing and presentation for market;
- (ii.) Co-ordination with Federal authorities in regard to grading and securing adequate information as regards defects noted by graders with a view to improvement of quality;
- (iii.) The need for standardisation of brands to establish reputation for Queensland produce in interstate and overseas markets.

4. *Storage*—

To advise in relation to the best form of control of State cold stores.

5. *Distribution*—

LOCAL—

To advise in relation to—

- (i.) The question of controlling local distribution, to ensure that dairy produce is retailed at reasonable rates according to actual quality, and that inferior produce is not offered for sale;
- (ii.) The question of establishing pools or central distributing agencies.

INTERSTATE AND OVERSEAS—

To advise in relation to—

- (i.) The question of adequate shipping facilities and the establishment of central co-operative distributing agencies in Southern capitals and overseas;
- (ii.) The necessity for appointment at the Agent-General's office of a dairy produce expert of business ability to report on the arrival of Queensland consignments in London and keep in touch with marketing thereof.

It has also been mutually arranged that the Dairying Standing Committee of the Provisional Council of Agriculture and the Dairying Industry Advisory Board shall act conjointly in dealing with all matters relating to the dairying industry which have been referred to these bodies.

(B) Fruit—

To consider—

1. In conjunction with the Department of Agriculture and Stock, the problems relating to the fruit industry of this State;
2. The question of improvement of the productiveness of orchards by systematic instruction in fruit culture in all its branches, by scientific investigation to prevent loss through diseases and pests, or by other efficacious means;
3. The efficacy of the existing Diseases in Plants Act, and to suggest any amendment that may be considered necessary with a view to the more efficient control of diseases and pests generally by compulsory cleanliness of orchards and prompt destruction of infested fruit;
4. The question of standardisation generally, including fixation of marketing standards of various fruits, institution of co-operative local or central grading and packing establishments, and the necessity for additional legislative authority to provide for the above;
5. The question of improved methods of storage and transport, including experiments in and adequate provision of suitable storage for fresh fruits; to assist in the regulation and transport of supplies for local interstate and overseas markets;
6. Marketing and distributing problems;
7. The establishment of pools or co-operative local interstate and overseas selling agencies;
8. The efficacy or otherwise of the Farm Produce Agents Act as a protection to growers consigning fruit to local markets;
9. The institution of a campaign for the popularising of the use of fruit, and for the creation of a stronger demand for Queensland fruits throughout Queensland and the other States of the Commonwealth.
10. The question of utilisation of surplus supplies by the establishment of co-operative canning and preserving plants, and the standardisation, labelling, and marketing of such products.
11. The question of extending the benefits of the Co-operative Act, or any other means of establishing credit for the encouragement of co-operation in the industry.
12. The best means of securing the effective co-operation of existing associations and Government institutions, including the State cold stores, State canning works, State Produce Agency, State Advances Corporation, and the Railway Department.

(C) Sugar—

To consider—

1. The question of the improvement of the productiveness of sugar lands by the planting of the best varieties, by the use of fertiliser, &c.
2. The question of means of combating diseases and pests.
3. The question of the purchase of fertilisers and farm implements through co-operative channels.
4. The question of assurance against losses through cyclones, fire, grubs, &c.
5. The devising of ways for the economic use of present waste products.
6. The question of a credit system with a view to assisting new settlers or to assisting canegrowers affected by failure of crops in dry seasons or otherwise.

(D) Wheat and General Agriculture—

To consider—

1. The question of investigating, in conjunction with the Department of Agriculture and Stock, the problems relating to the wheat and general agricultural industries of the State.
2. The methods of production, marketing, storage, and distribution of wheat, and of general agricultural produce.
3. The question of the continuance of the policy of wheat pools and of the possibility of the extension of the policy of pools to other branches of the general agricultural industry.
4. The question of the purchase of all farm requisites through co-operative channels.
5. The question of wheatbreeding, and the question of pure seeds as applying to the industry generally.
6. The question of extending the benefits of the Co-operative Agricultural Production and Advances to Farmers Act, or any other means for the establishment of rural credit.
7. Consideration of any matters arising in connection with general agriculture throughout the State; including the question of the appointment of expert instructors in the cultivation of cotton, rice, tobacco, or other crops.

Subjects referred to the Dairy Advisory Board—

To consider—

- (a) The question of investigating, in conjunction with the Department of Agriculture and Stock, the problems relating to the dairying industry of this State;
- (b) The methods of production, manufacture, marketing, storage, and distribution of dairy produce;
- (c) The question of the establishment of pools for dairy produce;
- (d) The question of the co-ordination of the activities of existing co-operative companies;
- (e) The question of the improvement of the productiveness of the individual dairy herds by general application of systematic herd-testing or any other efficacious means;
- (f) The question of the purchase of all factory and farm requisites through co-operative channels;
- (g) The question of fodder conservation;
- (h) The question of extending the benefits of the Co-operative Agricultural Production and Advances to Farmers Act, or any other means for the establishment of rural credit.

DISTRICT COUNCILS.

In each district determined by the Council of Agriculture there is to be established a District Council. Pending the establishment of permanent District Councils, provisional district councils may be constituted upon the recommendation of the Council of Agriculture. These provisional councils will hold office for a period not

exceeding one year in the first instance. Each of the approved districts will determine the number of members who will constitute the District Councils. In the beginning there are to be fifteen districts, namely—

No. of District.	State Electorates included in the District.
1	The new State Electoral Districts of Cairns, Chillagoe, Cook, Eacham, Herbert.
2	The new State Electoral Districts of Bowen, Kennedy, Mundingburra, Townsville.
3	The new State Electoral Districts of Charters Towers, Queenton.
4	The new State Electoral Districts of Mackay, Mirani.
5	The new State Electoral Districts of Fitzroy, Mount Morgan, Normanby.
6	The new State Electoral Districts of Keppel, Port Curtis, Rockhampton.
7	The new State Electoral Districts of Bundaberg, Burnett, Musgrave.
8	The new State Electoral Districts of Burrum, Gympie, Maryborough, Nanango.
9	The new State Electoral Districts of Cooroora, Wide Bay.
10	The new State Electoral Districts of Aubigny, Bremer, Cunningham, Ipswich, Lockyer.
11	The new State Electoral Districts of Bulimba, Logan, Murrumba, Nundah, Oxley, Stanley (also, <i>pro forma</i> , Metropolitan constituencies).
12	The new State Electoral Districts of Albert, Fassifern, Rosewood.
13	The new State Electoral Districts of Drayton, Pittsworth, Toowoomba, and Toowoomba East.
14	The new State Electoral Districts of Carnarvon, Warwick.
15	The new State Electoral Districts of Dalby, Maranoa, Murilla.

Additional districts and District Councils for those additional districts may be constituted from time to time upon the recommendation of the Council of Agriculture. Subject to the general control of the Council of Agriculture, each District Council may make its own rules with regard to the conduct of its business. The duties and functions of the District Councils will include:—

- (1) To secure co-operation as far as possible amongst the primary producers in the area covered by the District Council, regarding their common requirements;
- (2) To assist in developing schemes, in regard to production, marketing, standardisation, &c.
- (3) To assist in suggesting schemes for making more profitable use of the State experts and the facilities generally of the Department of Agriculture;
- (4) To assist in such matters as demonstrations of various kinds, co-operation in the purchasing of machinery, fertilisers, &c., promoting of herd-testing, fodder conservation, and to spread amongst the primary producers the latest and best information bearing on agriculture;
- (5) Generally, such other duties and functions as the Council of Agriculture may determine.

Local Producers' Association—

As an auxiliary to the District Councils there will be Local Producers' Associations. In any centre in which there are (say) no fewer than (say) ten *bonâ fide* primary producers, a Local Producers' Association may be formed. A convenient centre will be chosen by the District Council concerned to be the headquarters of the District Council. The duties of Local Producers' Associations will include the following—

- (1) To take the initiative in rural matters pertaining to the centre represented by the Association;
- (2) To ascertain the requirements of the centre and to formulate a scheme for having these requirements met;
- (3) To bring before the District Council, through the sub-district representative, requirements and problems which are not of purely local concern but are of common interest and concern;
- (4) To support and assist the District Council in its efforts to promote the general prosperity of the primary producers;
- (5) Generally, to co-operate with the District Council in enabling it to discharge its functions efficiently;
- (6) To endeavour to co-ordinate and correlate the work of the Progress Associations and smaller societies, and to strengthen the work they are doing in so far as it relates to the rural industries.

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 9th May, 1922) from Mr. Edmund Jarvis, Entomologist at Meringa, near Cairns:—

It is not generally known that we recognise at this laboratory at least fifteen different methods of combating our grey-back beetle during its grub stage.

These have been numerically arranged below according to their relative value as controlling factors, and may be very briefly enumerated as follows:—(1) Soil fumigants; (2) poison baits; (3) hand collecting; (4) soil repellants; (5) cultural methods; (6) larvicidal solutions; (7) introduction of parasitic insectivorous birds and mammals; (10) encouragement of indigenous parasitic and predaceous insects; (11) traps and cover crops; (12) introduction of bacterial diseases; (13) electrical controls; (14) mechanical control; (15) explosives.

It would, of course, be impossible for us to fully investigate *all* of the above-mentioned control methods, any one of the first seven of which could well engage the continuous activities of an entomologist. This fact may be more readily grasped when it is borne in mind that the abovementioned fifteen controlling factors relate exclusively to the grub stage; and that we recognise, and have been investigating so far as time permits, at least eight additional important methods of attacking *Lepidoderma albohirtum* during its aerial condition in the beetle form. Then again, various means of coping with the egg and pupal stages have been studied by us to some extent; with the result that quite recently (August to November, 1921) we have discovered that this cane pest can be destroyed during both of these obscure stages of its life-cycle by means of fumigating the soil with carbon bisulphide.

Naturally we are hoping that experimentation now in progress may yield positive results of an encouraging nature; but, as a rule, such success is preceded by a long series of negative results, which, however, serve a useful purpose by narrowing one's field of observation, thus tending to direct research work into more and more promising channels.

Obviously, the control methods entitled to first consideration in the list given above are those which may be supposed to hold, as it were, the key to the solution of the cane-grub problem.

In the writer's opinion the claims of No. 1 (soil fumigants) stand first and foremost as offering the best chance of successfully dealing with the grub stage of our grey-back cockchafer.

Under the heading of soil fumigants we have such substances as sulphurous anhydride; carbon bisulphide, &c., the latter of which we have used successfully against the grub.

If bisulphide could be administered quickly and evenly by means of suitable machinery it would, I think, be a decided step in the right direction and relieve the present situation very materially; but at the same time we do not, for several reasons, consider that nothing better can be found. During the past two months many fumigants have been tested by us with varying degrees of success. Time and again, as might be expected, the hopes raised by apparently conclusive laboratory experiments have been dispelled, as a result of field application; but, nevertheless, our results taken collectively have been sufficiently encouraging to well warrant closer investigation along similar lines.

INTRODUCTION OF PARASITES.

When reporting on this interesting question in July, 1921, I mentioned that various entomologists had been consulted with the view to obtaining reliable and comprehensive data regarding certain scoliid parasites likely to be serviceable if introduced into our cane fields. During the interval replies to my list of questions have come to hand from Dr. Guy A. K. Marshall, of the British Museum, and Professor S. Leffmans, Government Entomologist, Buitenzorg.

The former entomologist mentions six species of Scoliidæ that might meet our requirements. One of these, which resembles our own digger-wasp in colour, but is slightly smaller, inhabits New Caledonia; while three are from Dutch New Guinea, one from the Solomons, and one from Aru Island. He is of opinion that a number of other species hitherto uncollected are likely to occur in the more accessible portions of British New Guinea.

It was very interesting to learn also that the principal insect enemy of our scoliid wasps has not, up to the present, been received by the British Museum from New Guinea; so that very probably wasps introduced from there may be immune from attacks of the hyperparasite that controls the increase of our own digger-wasps.

Professor Leffmans has kindly enumerated nine species of Scoliidæ which are parasitic on scarabæidæ in Java. Three of these appear very promising, and might if introduced attack our cane-grubs; one of them, in fact (*Dielis thoracica* Fabr.), being similar in size to our own principal digger-wasp, and parasitic upon grubs of *Lepidiota stigma* F., a cockchafer belonging to the same genus as our cane-beetle *Lepidiota frenchi* Blackb. It also destroys the grubs of *Leacopholirorida*, a cane beetle which is just the same size as our grey-back beetle.

Dielis thoracica, which is the most promising and abundant digger-wasp, occurs in East Java and on the south coast of Sumatra, where it is found practically throughout the wet season, and also during the dry monsoon of six months. In general it is confined to areas badly grub-infested, attacking second and third-stage grubs of four different scarabæid beetles. Its life-cycle occupies from thirty-nine to sixty-two days, the intra-cocoon stage being longer than that of our digger-wasp *C. tasmaniensis* Sauss., which has a life-cycle of from forty-three to forty-eight days. Forty-two eggs have been obtained by dissection from one female of *thoracica*, but in all probability this species, like that of our own digger-wasp, is able to produce about twice that number.

In Java the adult wasps of *thoracica* frequent honey-bearing flowers belonging to the orders Compositæ, Malvacidæ, &c., including those of the genus *Sida*, three species of which occur around Meringa, and are habitually visited by our *Campsomeris* wasps.

A Bombylid and some Conopid flies are suspected of being hyperparasites of *D. thoracica* and other scoliids in Java; but Professor Leffmans does not consider these of much economic importance.

On the whole the situation with regard to *D. thoracica* appears hopeful, and in the event of its hyperparasites not occurring in Queensland conditions here should be very favourable to the increase of this useful insect. This matter of secondary parasites, however, will be further studied.

At all events we purpose, as a preliminary step, to obtain with as little delay as possible living specimens of *thoracica* and of *Dielis javana* Lep. (another species likely to prove useful here) for purposes of breeding and study at this laboratory.

Owing to the length of the intra-cocoon stage of both these wasps Professor Leffmans believes that cocoons containing living pupæ could be successfully shipped to Australia. We hope, therefore, to be able to arrange for an exchange of parasites, and have advised him of our willingness to forward to Java cocoons of *Campsomeris tasmaniensis* in return for those of *Dielis thoracica* and *Javana*. This question of the introduction of parasites for our cane-grub will form subject for a special report in the near future.

A NEW MOTH-PEST OF CANE.

We have to record another addition to our lepidopterous pests of sugar-cane, viz.:—*Spodoptera Mauritii* (Bois.) Hampson, one of the so-called grass or army worms, which affects cane in Hawaii; where, before the introduction of the mynah bird, it was reported that whole fields of cane were often completely destroyed.

The eggs of this noctuid moth are laid in batches of an oblong or circular outline, consisting of sixty or more eggs deposited side by side and covered with a pinkish-brown felted mass of hairs taken from the body of the insect. Each female probably deposits in all from 350 to 400 eggs, affixing the batches to leaves of bushes, ceilings, walls, &c., but usually in situations immediately over or close to herbage, and the tiny larvæ upon hatching drop down on threads of silk until reaching grass blades. About eighteen days later, when fully grown, they measure $1\frac{1}{4}$ inch in length, and are then greenish-brown, with yellowish subdorsal and spiracular bands, the former having a dark line on the lower edge, and the latter being placed just below spiracles. The anterior dorsal portion of each body segment excepting the first encloses two triangular black patches, which are very variable, and in some specimens appear as short thick streaks. Spiracles, dark-brown; ventral surface greenish-yellow; head greenish-brown, with face yellow, mandibles dark red. Body cylindrical, tapering slightly towards each end, and bearing a few scattered black hairs.

Pupation takes place underground, this stage occupying a period of three weeks.

Caterpillars of this grass-worm were observed by the writer defoliating cane that was growing in cages used for breeding tachinid fly parasites.

Fortunately this new moth-pest is of very minor importance at present, and not likely to prove troublesome in the future.

It makes the eighteenth lepidopterous insect observed injuring sugar-cane in Queensland; and is probably controlled naturally by a number of parasitic and predaceous enemies.

GRAPE CULTURE IN QUEENSLAND.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

In the course of the past twenty-five years a great deal of very useful information and sound advice relating to the culture of the grape in this State has appeared from time to time in the *Queensland Agricultural Journal*, as well as in the form of special bulletins.

In the early days of the *Journal* Mr. E. H. Rainford, then Queensland's viticultural expert, contributed a number of excellent articles on all branches of the industry, and his writings were followed by those of Mr. Chas. Ross, late Instructor in Fruit Culture, who placed on record a description of many varieties of grapes that have been tested in this State, as well as the districts most suitable for their culture. Mr. Ross also contributed useful advice on the culture of grapes and the methods of pruning best suited to the several varieties. In addition to the information supplied by these departmental officers, there are many references to grape culture and wine making scattered generally throughout the back numbers of the *Journal*, including a very interesting series of articles by Mr. Gattino, of Charleville.

Matter relating to viticulture is so widely distributed among departmental publications that it is impossible for a beginner to obtain the instruction he requires in a readily available form. It is therefore my intention to endeavour to condense the information that has previously been given in departmental publications and issue it in pamphlet form. We are constantly receiving inquiries from persons who have recently taken up agricultural or horticultural pursuits and who do not possess even the most rudimentary knowledge of the conditions required for the successful culture of the grape or of the treatment it requires; and it is to help these new growers that I am preparing this pamphlet.

As I am writing more for the beginner than for the expert vigneron, it is advisable to start from bedrock, and this necessitates a knowledge of the origin of the grapes which are grown in this State.

All commercial varieties of grapes belong to the genus *Vitis*, of the natural order *Ampelidæ*, and several species belonging to this genus are cultivated.

Of the genus *Vitis* the species *Vinifera* is by far the most valuable and the most widely cultivated, as it embraces all our so-called European varieties and includes all the best wine, table, and drying grapes. The home of *Vitis vinifera* is in Persia and Armenia, and from there it spread all over Europe and eventually to all the temperate and semi-tropical parts of the world. It does not thrive in the tropics. It is a deciduous plant, and therefore requires to be grown in a climate having a sufficiently cold winter to permit of its undergoing a complete rest. It can stand great summer heat, and thrives in hot dry climates when grown in a suitable soil, which is kept in a state of perfect tilth, even though there is little or no summer rainfall, provided there is a sufficiently good winter rainfall; but when this is lacking irrigation is necessary.

At the same time, it can stand many degrees of frost when in a dormant condition, although it is very easily injured by frost during the period of active growth.

The grapes belonging to this species, therefore, require a sufficiently cold winter to undergo the necessary rest and a warm, dry temperature when the fruit is ripening. A wet climate is not suitable.

It will thus be seen that the purely coast districts of Queensland are not the most suitable in which to grow *V. vinifera*, as the winter temperature is too high, especially in the more northern parts, where also the summer is frequently so moist and humid that it is conducive to the development of fungus diseases, but not favourable to the proper development of the sugar contents of the fruit. For this reason, it is only when we have a hot and dry summer on the coast that we can grow certain varieties of *V. vinifera* to perfection, as under normal climatic conditions it is only in a very few favoured localities and by the exercise of especial care that these varieties can be grown successfully.

As one goes back from the coast the conditions improve, and as soon as the main coast range is crossed in the southern half of the State the growing of many varieties of *V. vinifera* is possible, though several kinds of wine, table, and drying grapes that are susceptible to fungus diseases require to be grown even further west. This refers particularly to the growth of drying grapes, as, in order to produce a good raisin, sultana, or other dried grape, it is essential that the grape shall develop a very high percentage of sugar in its juice, and it can only do this in a hot and dry climate. This accounts for the excellent raisins and sultanas produced in the Murray River districts of Victoria and South Australia, where the normal summer conditions are hot and dry.

Certain varieties of *V. vinifera* do very well in the Central district, and Westwood, which is only some 30 miles west of Rockhampton, produces excellent Muscats, both black and white, as well as many other good varieties of table grapes. Many varieties also grow to perfection on the Peak Downs, desert country, and even further west, when given the necessary care and attention. In Northern Queensland a few varieties can be grown successfully at Charters Towers, Pentland, and even further inland; but they cannot be grown on the coast and do not succeed well in the Cairns Hinterland, even at high altitudes.

It will thus be seen that the successful cultivation of varieties of *V. vinifera* is confined to localities in which the climatic conditions are favourable for its growth, and that it is unwise to grow them elsewhere. Thousands of cuttings have been planted from time to time under totally unsuitable climatic conditions, all of which have proved a complete failure. Despite this experience, similar varieties are still being planted year by year under similar conditions. Failure under such conditions is inevitable, and it is a strange fact that many persons refuse to accept well-known facts until they are proved by their own experience.

Grape vines belonging to *V. vinifera* are easily distinguished from other species of *Vitis* by the leaves, which are more or less deeply lobed and of which the edges are toothed or serrated; the leaves are also shiny when young and generally smooth. The wood is stouter and the nodes or joints much nearer together than in other species. The skin of the fruit adheres to the flesh, which is juicy and firm, and the seeds are of a different shape to those of other species.

There are very many individual varieties of *vinifera* the fruit of which varies widely in size, colour, flavour, period of ripening, and production. As already mentioned, all the best drying, table, and wine grapes belong to this species. Several wild species of *Vitis* have been cultivated in America and imported varieties have been grown in Queensland for many years. They are all included under the general heading of American grapes and have proved capable of being grown under conditions that are by no means favourable for European varieties, for not only can they be grown successfully on our Downs country but also on the country lying between the Downs and the coast, as well as the actual coast country, excepting our most tropical districts, where no variety of cultivated grape is found to thrive.

American grapes belong to four species ("American Grape Growing," Husmann), viz.—

1. *Vitis labrusca*, the Northern Fox grape.
2. *Vitis aestivalis*, the Summer grape.
3. *Vitis cordifolia* or *V. riparia*, the Winter or Frost grape or the Riverside grape.
4. *Vitis vulpina*, the Southern Fox grape.

In addition, there are several other species of *Vitis* of which there are no cultivated varieties. All American grapes are more or less resistant to the fungus diseases that attack European grapes, and they will thrive in a more humid climate. Some varieties, and particularly hybrid varieties, either pure American hybrids or American-European hybrids, are also very resistant to phylloxera and are not injured to any appreciable extent by this destructive insect; still they are not immune, as there is no such thing as an absolutely blight-proof stock. Several of these hybrids are used as resistant stocks on which to graft varieties of *vinifera* for which purpose they are admirably adapted, as many of them are very vigorous growers and possess a fine root system. American grapes are distinguished by their leaves being entire and not lobed, and being always more or less downy or felted on the under side; by their long jointed thin wood and frequently rampant growth; and by the skin of the fruit separating readily from the flesh, which is of a slimy nature and has more or less of a foxy taste, much more noticeable in some varieties than in others.

American grapes are of considerably less value than the better European varieties; still they are valuable to this State in that they can be grown successfully in the coastal districts where other grapes fail.

A large number of American grapes have been introduced into this State, of which the following varieties are recommended:—

Labrusca type: Goethe, Iona, Martha, Wilder, Improved Isabella, or Pierce.

Aestivalis type: Herbemont, Lenoir.

Cordifolia type: Elvira.

Vulpina type: Seppernong.

Of these varieties, Lenoir is only valuable for wine making. It has dark purple flesh, and its juice is so dark that it is valuable for giving colour to red wines; and Seppernong, though highly spoken of in the Southern States of America, has so far never been grown successfully here, though our coast climate should suit it.

SOILS SUITABLE FOR GRAPE CULTURE.

Grapes can be grown on nearly every kind of soil, provided it possesses good natural drainage and has no hard-pan or cement underlying the surface soil. Good drainage is essential, as no grape vine will thrive with stagnant water at its roots.

Good free loams, sandy loams, alluvial loams, and even fairly heavy loams having good drainage are all suitable for grape culture; but the best soil is a deep free warm loam, either of a granitic, basaltic, sandstone, or limestone origin or of an alluvial nature.

Very rich soils are not as a rule suitable, especially in the coast districts, where the rainfall is heavy, as the vines grown on them tend to produce wood rather than fruit and are more liable to disease.

The dominant plant food of the vine is potash; consequently granitic soils rich in potash-yielding felspar, such as those of parts of the Stanthorpe district, are noted for the quality of the fruit they produce, and the sandy soils of our Western country, which also contain a supply of potash in an available form, produce fruit of high quality both for wine and table use. A high sugar content in their juice is developed under the hot and dry conditions that govern their growth.

Soils rich in lime are also very suitable for grapes, but as already stated any good, free, well-drained, loamy soil will grow good grapes if the land is properly prepared prior to planting and the vineyard is looked after when planted.

Situation of Vineyard.—In districts not subject to late spring frosts the situation of the vineyard is of very little importance—in fact, provided all other conditions are satisfactory, the more level the land is the better. Where late spring frosts, however, have to be taken into consideration, such as in the Granite Belt, the best situation is one well protected from all heavy and cold winds and that does not face the rising sun, so that it will be some way above the horizon before its rays actually strike the vineyard.

PREPARATION OF THE LAND.

This is summed up in one word—it must be *thorough*. Old writers on the grape always give very explicit instructions regarding the preparation of land prior to planting the vines, both when the vines are grown under glass and in the open. In the case of the former the soil of the bed in which the vines are planted is very carefully prepared or compounded and perfect drainage is provided, and in the latter the soil is trenched at least two spits deep and brought into a very high state of tilth. In the early days of grape-growing in Australia trenching the soil was considered essential, but experience has shown us that it is not necessary and that the heavy expense incurred is not warranted. The land for the vineyard must be thoroughly cleared—that is to say, all trees must be properly grubbed out and all roots run to a depth of at least 18 in. from the surface, deeper if possible, so as to permit of the land being ploughed as deeply as the surface soil will permit. The land should thus be subsoiled to at least 18 in., and deeper if it is possible to procure the power necessary for the work. After clearing, running all roots, and burning off, the land should be ploughed and cross-ploughed as deeply as the surface soil will permit; but the subsoil should not be brought to the surface. The soil proper should then be worked down fine and brought into a good state of tilth. It should then be again ploughed with a single-furrow plough, and a strong subsoil plough should follow in the furrow and break or stir up the subsoil as deeply as the power available will permit, but no subsoil should be brought to the surface. A powerful single-disc plough with a large disc 26 to 30 in. in diameter, followed by a very strong subsoil plough fitted with a bull-tongue share, makes an excellent combination. Land so prepared encourages the deep rooting of the vine—a very important consideration in our climate, where we are subject to long dry spells and depend mainly on intensive and deep cultivation to maintain the necessary supply of moisture in the soil.

Surface roots are the first to suffer during a dry spell, and further they are in the way of the cultivation that is so essential for the retention of moisture.

As already stated, the preparation of the land must be *thorough*. It may cost a little more at the start, but it will pay handsomely in the long run. “Good enough” is not *good enough* unless it is *thorough*. Many a vineyard is spoilt by planting the vines before the land is in a fit state to receive them.

PLANTING.

Having prepared the land for the vineyard as described, it is ready for planting, but the actual planting should not take place until the sap starts to rise in spring, for if planted then the cuttings will develop roots at once and start into growth very quickly; whereas if planted whilst the cuttings or vines are completely dormant there is always a chance of their drying out before starting growth. Given sound, well-matured cuttings and the land in perfect tilth, every cutting should grow, if

properly planted, at the right time. If unrooted cuttings are used, and they are by far the most satisfactory if they are properly treated—that is to say, if they have been cut from well-matured, healthy wood that has not been allowed to dry out—they are best planted with a bar. The method of doing so is as follows:—One man makes a hole in the soil of sufficient depth to take the cutting, and a second man places a cutting in the hole and holds it with one eye at the surface of the ground and one eye only above the ground. The first man inserts the bar into the soil at an angle a short distance from the cutting and then pushes the soil with the bar towards the cutting, thus closing the hole first made and tightening the soil all round the cutting. The soil must be quite firm all round the cutting and at its base, otherwise the cutting will dry out. A properly planted vine should be set so firmly in the soil that it can only be pulled out by the exercise of considerable force. As the bar is removed from the soil, the second hole made should be filled in with the bar. One of the greatest mistakes that is frequently made not only by beginners, but by older vignerons, is to leave far too much of the cutting out of the ground; 2 in. or 3 in. is ample, and yet one frequently sees more than 1 ft. left in the air to dry out. It must be remembered that no matter what type of pruning is to be eventually followed, only one cane coming from as near the surface of the ground as possible is required to form the future main stem of the vine. If rooted vines are planted instead of cuttings, they require very careful treatment and handling, for if the roots are exposed to the air for any time they are seriously injured.

On the receipt of rooted vines from the nursery they should be examined very carefully and all surface roots should be removed, only the roots that have started from the base of the cutting being allowed to remain, and these should be shortened back to a couple of inches in length. All the previous year's growth of wood should be pruned away excepting the best and strongest cane, which should be cut back to not more than two eyes in length, and from one of these eyes the cane destined to form the future main stem of the vine will be produced. Rooted vines cannot be planted with a bar, but if the land has been prepared as described a comparatively small hole will suffice. The vine should be set at about the depth at which it was growing in the nursery, and the soil should be packed firmly round it in order to permit its drying out. If the soil is very dry, a little water can be placed in the bottom of the hole at the time of planting, so that the base roots will come in contact with the moisture, and fine dry soil should then be used to fill in the hole. The distance apart at which to plant vines depends on the nature of the soil, its power to retain moisture, and the rainfall of the district in which the vines are grown.

European vines are grown both on a trellis and in the bush form; the latter with or without stakes as may be required; but American grapes must be trellised.

European grapes when trellised should be planted at from 6 ft. to 8 ft. or even more apart in the row and not less than 10 ft. between the rows, but when grown as a bush they should be planted on the square, not less than 8 ft. by 8 ft. or, better still, 10 ft. by 10 ft. and even wider planting in hot, dry districts. Don't crowd your vines; it pays to give them plenty of room, especially in dry seasons. American grapes require more space, and should be planted 12 ft. or more apart in the row, as many varieties are strong growers.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 11.

YELLOW-WOOD (*Flindersia Oxleyana*).

Unlike a large number of our scrub timbers, the yellow-wood is well known, and has been used a good deal for coachbuilding, railway carriage frames, and general joinery work. The trees attain 140 ft. in height and a barrel diameter of about 3 ft. As a rule the barrel is not flanged. The bark is grey or greyish brown, very scaly, and is shed in oblong pieces; when cut, the outer part is seen to be brown and the inner part dull yellow; it measures about $\frac{3}{4}$ in. thick on a tree with a barrel diameter of 2 ft. 2 in. It has been observed that the trees flower in December and January. The yellow-wood is not found growing naturally outside of Australia, and has been observed in scrubs of the coastal area from the Richmond River, N.S.W., to Gympie. The photograph of the capsule shows that this species is allied to the crow's ash and the Queensland maple, both of which also belong to the genus *Flindersia*. As an ornamental tree the yellow-wood deserves a prominent place in parks, gardens, and streets, but up to the present it has been almost entirely neglected in this respect. The accompanying photographs and the field notes given above will enable the reader to recognise the tree if it grows in his district.



Photo. by the Authors.]

PLATE 72.—THE YELLOW-WOOD (*Flindersia Oxleyana*), IMBIL SCRUB.



PLATE 73.—THE YELLOW-WOOD (*Flindersia Oxleyana*).
A.—Seed. B.—Placenta. C.—Capsule. C, natural size; remainder to scale.

ANSWER TO CORRESPONDENT.

F. C. MOLLER, Teviotville.

In reply to your letter of 12th May, asking for advice as to the advisability of laying down a concrete floor waterproofed by the addition of oil, this Department communicated with the Public Works Department on the subject, and received the following memorandum:—

“*RE* WATERPROOFING CONCRETE BY ADDITION OF OIL.

“The oil used should be of a heavy, viscous nature, of mineral origin. A suitable oil could probably be obtained from the Vacuum Oil Company.

“The concrete proportions should be:—1 bag cement, 2½ cubic feet sand, and 5 cubic feet broken stone; or, 1 bag cement, 1½ cubic feet sand, and 6 cubic feet graded gravel. Mix the concrete as usual, and after the water has been added, and the concrete turned twice wet, then add the oil and turn twice again, raking the heap while the concrete is being shovelled. The oil will be quickly emulsified and thoroughly mixed with the concrete.

“The oil should be in the proportion of one-tenth by volume to the cement used. The water employed in mixing the concrete should be clean rain water.

“The resulting concrete will be dense and impervious to water, but it is uncertain as to whether it would resist the action of animal urine if used in cow bails.”

SCIENCE NOTES.

By EDMUND JARVIS, Entomologist, Bureau of Sugar Experiment Stations.

Under this heading it is proposed each month to record discoveries likely to interest scientists and relating to insect pests of sugar-cane and their parasites.

EARLY STAGES OF *MACROSIAGON CUCULLATA*, MACL.

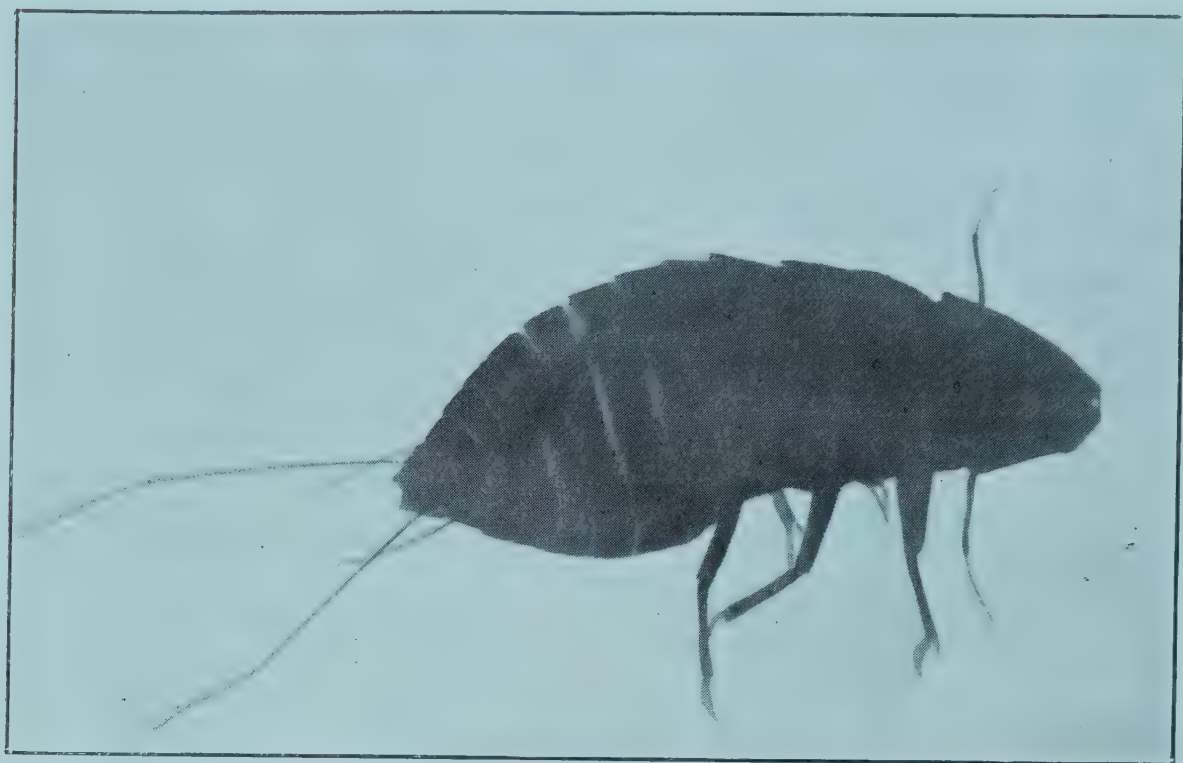
A hyper-parasite of the above genus—viz., *M. pictipennis*, Lea—has, since the year 1915, been considered an enemy of our useful digger-wasp parasites (*Campsomeris tasmaniensis*, Sauss., and *C. radula*, Fabr.).

Nothing, however, was known respecting the life-cycle of these curious beetles until quite recently (December, 1921), when Mr. W. Cottrell Dormer, Assistant Entomologist, had the good fortune to observe specimens of *cucullata* in the act of ovipositing on the under-surface of leaves of *Ficus opposita* and *Urena lobata*.

The eggs, which are white, of elliptical form, and measure 0.45 x 0.15 m.m., numbered a hundred or more, and were placed close together but without definite arrangement amongst the hair of the leaf, over an area of about 1½ square inches. During the period occupied by the egg stage they were kept under quite dry conditions in glass tubes, and a fortnight later had commenced to darken, becoming black and finally hatching after 17½ days.

The minute and active triungulin, representing the first larval stage (figs. 1, 2), resembles in general appearance and structure that of a closely related European species (*Rhippiphorus paradoxus*), and, like that insect, probably frequents flowers visited by hymenoptera in the hopes of attaching itself to some suitable wasp and being carried into its nest. If successful, it probably waits until the egg of its host hatches, and then enters the body of the young maggot. A *Campsomeris* wasp was placed by us for a few seconds in a large test-tube containing about 25 triungulins, and then put under chloroform. Examination revealed numbers of the latter tightly embracing various hairs on the tarsi, clypeus, neck, pronotum, &c., of the wasp. Upon reviving, and discovering the presence of these minute enemies, it endeavoured to brush them off, but only succeeded in killing one and removing two others. Subsequently, these triungulins were carried underground by the host, and after oviposition had taken place one of them remained on the egg attached to the paralysed grub for three days, making no attempt to pierce the chorion, but apparently awaiting the appearance of the maggot of the wasp. The triungulin itself is a black and almost microscopic insect, barely visible to the naked eye, measuring 0.53 x 0.16 m.m.

By the aid of a sucker situated ventrally on the anal segment, it is able when necessary to stand on its tail, thus leaving all legs free, when about to lay hold of wasps visiting the flowers.



1.—Unflattened specimen, showing convexity of dorsal surface.

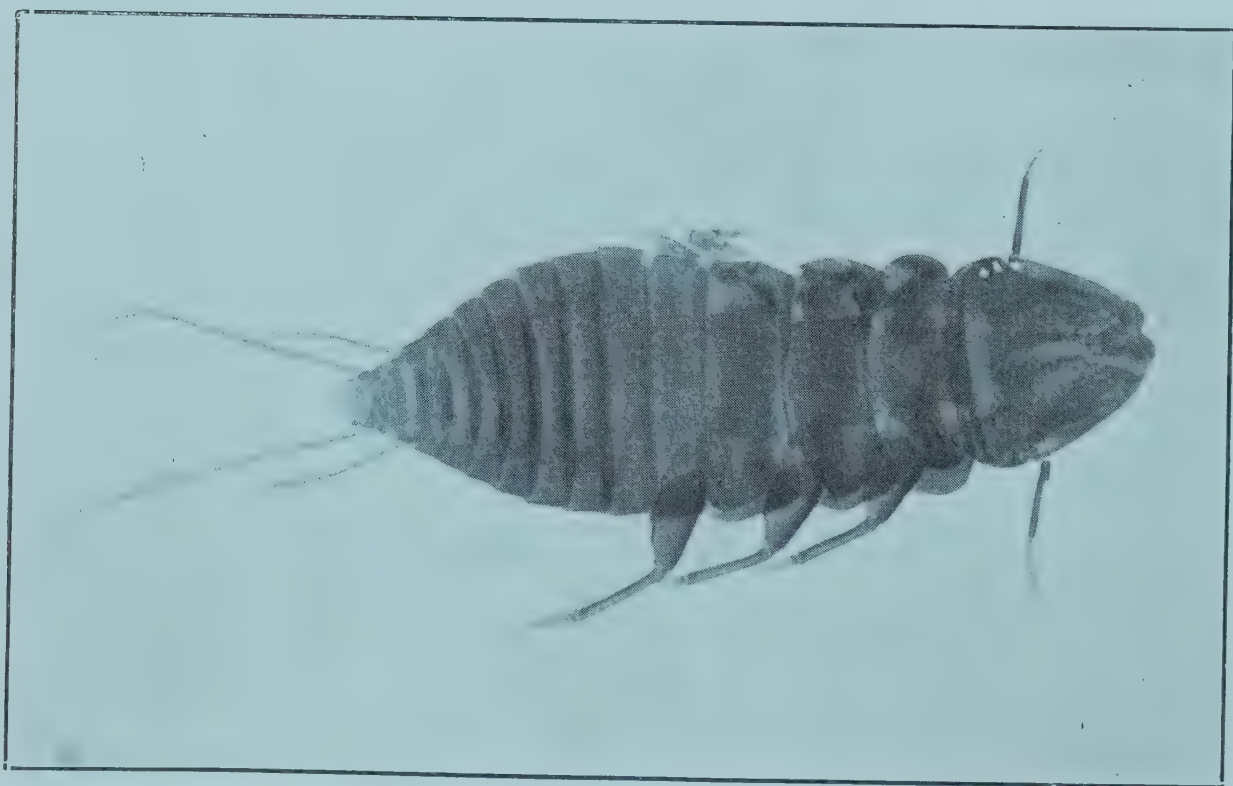


Photo. W. C. Dormer.]

2.—Specimen mounted in balsam (magnified 153 diameters).

PLATE 74.—TRIUNGULIN OF *MACROSIAGON CUCULLATA*, MACL.

FRUIT FLY INVESTIGATIONS.

[SECOND PROGRESS REPORT.]*

By HUBERT JARVIS, Entomologist in Charge of Fruit Fly Investigations at Stanthorpe.

The Minister for Agriculture and Stock (Hon. W. N. Gillies, M.L.A.), has made available the Second Monthly Report, dated 15th April, of Mr. Hubert Jarvis, Entomologist in Charge of Fruit Fly Investigations at Stanthorpe, received through Mr. Henry Tryon, Entomologist-in-Chief.

*In forwarding the following report, I would direct attention to the transference—as narrated therein—from Brisbane to the “Granite Belt” of Southern Queensland, of the fruit fly parasite *Diachasma Tryoni* (Cameron) *Silvestri* as being the first of several hymenopterous parasites of fruit flies that it might be found practicable to utilise in controlling these “pests” both there and elsewhere in the State.*

(Sgd.) HENRY TRYON,
Entomologist-in-Chief.

*This insect, originally discovered by this Office in 1892 and referred at the time to the genus *Opius* (Braconidæ, Hym.) (Vide Tryon, H., “The Parasite of the Fruit Maggot,” Trans. Nat. Hist. Soc. Qld. I. pp. 8-9, Brisb. 1895) was in 1911 named *Opius Tryoni* by Cameron, but placed more correctly in the genus *Diachasma*, by F. *Silvestri*, in 1914.*

*Already in 1910 W. B. Gurney published important information regarding its parasitic habit, in New South Wales, confirming what we had previously stated as to the extent that this was displayed in Queensland in relation to our commoner fruit fly. In 1913 the abovementioned Italian savant conveyed this *Diachasma* to Honolulu, an action on his part that led to its general distribution throughout the Hawaiian Islands, for since then it has been continuously bred and distributed.*

*Nothwithstanding in realising this event it was only liberated on August, 1914, it was by the end of this year found already destroying the fruit fly of coffee (*C. Capitata*) in the Kona Valley to the extent, in some instances, of 40 per cent. And, although its services in parasitising fruit fly maggots in the larger fruits are limited, by reason of the shortness of its ovipositor (relatively long, however, for a fruit fly braconid) it is considered by us that it should prove useful in reducing the strength of the earlier broods of fruit flies at Stanthorpe, that are yielded by maggots infesting cherries and certain small early ripening plums.*

(Intld.) H.T.
20-4-22.

FIELD OBSERVATIONS.—PERIOD, 14TH MARCH TO 14TH APRIL, 1922.

Wintering of Fruit Fly.

The search has been continued for the pupæ of the fruit fly (*Dacus Tryoni*) in various districts, under the following orchard trees:—Apple, peach, nectarine, plum, and apricot, whose fruit crop (three weeks or more gathered) had been badly infested with fruit fly maggots.

The soil to a depth of 1 foot right around individual trees has been carefully sieved and examined, but no live pupæ have been so far encountered. The ground under two large apricot trees, “whose entire crop was ruined by fruit fly maggots,” (*vide* W. Warry, Esq., Stanthorpe) gave, too, negative results, although many empty pupa cases were secured.

Activity of Fruit Fly.

The Queensland fruit fly (*D. Tryoni*) was on the 20th March, 1922, observed in numbers ovipositing in ripe quinces at The Summit; ten flies were captured on the fruit in about half an hour, one of the number proving to be a female specimen of *D. Tryoni* var. *Solani* (The Solanum fruit fly).

The quince on which this fly was captured is at present under observation, in this office, and it will be interesting to see if the “Solanum” fly will (contrary to our present belief) attack cultivated fruit.

Two female examples of the Solanum fly (*D. Tryoni* var. *Solani*) were found at Ballandean (Mr. D. Watts’s orchard) in a “Magnet” trap baited with “Magnet” lure. This trap had been on the trees for about eight weeks (*vide* D. Watts, jnr.).

* Early in February of this year Mr. Hubert Jarvis, of the Division of Entomology, Department of Agriculture and Stock, was appointed to investigate the fruit-fly problem in the Granite Belt. His first progress report was published in the May Journal.

Longevity of Fruit Fly.

In order to ascertain how long the fruit fly will live, 100 are being kept in large glass jars in the laboratory, and fed twice daily.

These flies, hatched from 3rd to 8th April, 1922, are all at present alive and active.

Destruction of Maggot-Infested Fruit.

Some considerable time has been devoted to examining "dumps" where fruit has been burnt, with a view to determining the safety or otherwise of this method of dealing with maggot-infested fruit.

Under one such dump, where a large quantity of peaches had been burnt, forty pupæ were secured. Most of these pupæ were found about $\frac{1}{2}$ an inch deep in hard soil, and under the space occupied by the centre of the fire; but some, however, were concealed under logs and other suitable cover at the edges of the fire. From these forty pupæ, taken 23rd March, 1922, twenty-six fruit flies hatched between the 5th and 10th of April, 1922.

This seems to indicate that burning fruit on the ground is not a reliable means of destruction, as many of the fruit-fly maggots would, on feeling the heat, if not earlier, escape from the fruit and enter the soil, therein pupating, and in due course giving rise to more fruit flies.

The plan adopted by many orchardists of first laying a timber foundation, on which to deposit the fruit, and then building the fire on top, should prove more effective than when this procedure is not followed, although I am convinced that a good percentage of maggots would escape even then.

A practice most strongly to be condemned (fortunately only one instance has come under my notice) is the dumping of fruit on *uncleared land* (adjoining the orchard) and covering the same with brushwood, omitting any further action.

The instance referred was brought to light at The Summit. A large quantity of fruit had been carted to the spot and dumped there, sticks and brushwood having been placed on top, presumably with the object of screening it from view. A large number of living pupæ were found in the soil under the fruit, but from by far the bigger number some thousands of flies had already emerged, leaving only an abundance of empty pupæ cases.

It is difficult, indeed, to believe that any orchardist could be guilty of such a practice, especially being aware (as he must well be) of the serious situation created by the fruit-fly as a pest in the Granite Belt, and also of the co-operative effort being made by all intelligent growers (the majority) to control this pest.

While such a procedure is possible, however, little hope can be entertained of a practical control of the fruit-fly in the Stanthorpe area.

Drowning Fruit-fly Maggots.

Experiments have been made in order to determine how long the maggots and pupæ of the Queensland fruit fly (*D. Tryoni*) will live (immersed) in water.

Fruit-fly maggots and pupæ have been placed in glass jars and covered with 2 to 3 inches of water for three, four, and five days.

Results prove that maggots and pupæ perish if immersed in water for four or five days.

Data relating to this experiment will appear in a later report.

The above experiment would suggest drowning as a satisfactory and safe way of dealing with the maggots in infested fruit.

Any old tank or large barrel would serve the purpose. The fruit should be covered with at least 2 inches of water, and left for five days. It should then be taken out and ploughed in for manure (if so desired) without any danger of fruit flies hatching.

Burying the Maggot-Infested Fruit.

As regards burying fruit, it has yet to be proved how far the fruit fly (*D. Tryoni*) will burrow through soil or sand after emerging from the pupa. Instances are on record (*vid. Annals of Ent. Soc. America*, vol. vii., No. 3, 1914) of the melon fly (*D. Cucurbitæ*) burrowing upwards through 2 feet of wet sand.

Experiments to test this in relation to our own fly (*D. Tryoni*) are being carried out, and results will be available later.

CONTROL MEASURES.

Natural Enemies.

On the 25th of last month a visit was made to Brisbane and districts with a view to introducing to the Stanthorpe area the fruit-fly parasite (*Diachasma Tryoni*, Cam. (*Braconidae*)). After conference with the Entomologist-in-Chief (Mr. H. Tryon), three days were spent at Goodna collecting this parasite, with no small success.

About forty specimens were secured alive (the majority being female) and also a good deal of infested fruit likely to yield additional specimens.

These parasites were successfully transferred in glass tubes to this district, with only a few casualties. Twenty were liberated, and the remainder kept for experimental work and for special observation.

This parasite (*Diachasma Tryoni* Cam.) is a small, active, red-coloured wasp, 8 to 9 mm. (just over $\frac{1}{2}$ inch) long. The ovipositor (egg-layer) in the female is almost as long as the rest of the body. The insect is furnished with ample wings and very long sensitive antennæ.

Opius Tryoni Cam. may be seen on warm days flying around and lighting on maggot-infested fruit. If watched closely it will be seen to pass with quite short, jerky movements over the fruit, touching the same from time to time with its waving antennæ, its whole attitude suggestive of listening. When, possibly, by a sense of hearing or some other instinct, it has located the fruit-fly maggots beneath the skin, it stops, raises its body to a perpendicular position, and inserts its ovipositor in the fruit, working it in by downward movements of the body until it is buried about $\frac{1}{2}$ of an inch deep in the flesh. It then, by an upward movement, withdraws its ovipositor, cleans it with its posterior pair of legs, and almost immediately repeats the operation at another spot.

So persistent and active are these little wasps that specimens under observation have made as many as twenty punctures in the fruit in twenty-five minutes, the process taking from $\frac{3}{4}$ to $1\frac{1}{4}$ minutes. It is probable that some punctures serve as probes to locate the prey.

The *Opius* can only reach the maggot when the latter is close underneath the skin (i.e., full grown and on its way out of the fruit), or approaching the surface in breathing.

An effort is being made to breed these parasites in the laboratory, and it is hoped that a control method of value may thus result.

Under these laboratory conditions as many as five of these parasites have been observed ovipositing at once on one individual fruit.

(Note.—A pressing need at present is an insectary, where these and other insects could be bred and studied under natural conditions.)

Trapping and Luring.

Owing to the lateness of the season and the almost entire absence of fruit, trapping experiments in the field, by means of lures, no longer give good results, although a few flies are still being caught.

Five fruit flies submitted on 8th April, 1922, for identification by Mr. Schneider, of Broadwater, and said to be caught with a new lure (his own discovery) proved to be all female examples of *D. Tryoni*, the Queensland fruit fly.

Useful Insects.

The so-called "grey maggots," destroying the woolly aphid of the apple and doing very good work indeed in this direction, prove to be the larval forms of two species of Syrphidæ ("Hover flies") *Syrphus viridiceps*, Macq. and *Syrphus pusillus*, Frog.

Both species are renowned (as are so many members of this family) aphid-eaters. The adult flies (bred in this office) are handsome insects of a bronze-black colour, the body banded with bright yellow.

The Hover fly lays its egg among or close to the woolly aphid (*Schizoneura lanigera*), and the young larva, on hatching, immediately starts feeding on the abundance of food surrounding it that these insects constitute.

When full grown (above $\frac{1}{2}$ an inch long) it seeks a retired spot and turns to a pyriform (pear-shaped) dark-brown chrysalis or pupa, from which in due course it comes as the adult Hover fly.

Unfortunately, the Hover flies also have their enemies, the two species referred to being attacked and parasitised by a small braconid wasp. This happens to these flies when in the maggot stage and whilst they are too feeding on the woolly aphides. Two specimens of this Hover fly parasite have been bred in this office.

Tomato Fly.

As was anticipated, maggots found in tomato and bred in the laboratory prove to be the tomato fly (*Lonchaea splendida*), and not a true fruit fly (*Trypaneidae*).

Office Work.

I am indebted to the following orchardists and others for donations to the official collection of economic insects:—Mr. W. Ranger, Mr. A. Paget, Dr. J. F. Roberts, Inspector J. Henderson, Inspector F. Williams, and Mr. F. Sellars (Stanthorpe).

It will, it need scarcely be stated, be of the greatest assistance to us to receive from orchardists and others interested, specimens of all insects that come under their notice, whether useful or otherwise; thus, and by our own efforts also, will a valuable collection of economic insects be built up, and be of much service, both as a means of study and for future reference.

GENERAL NOTES.

The Secret of Potato-growing.

“The great secret in potato-growing,” continued Mr. Hiam, “is to get the proper seed, and the system adopted in Jersey could be followed with advantage. The potato-growers there secure all their seed from their own stocks. The greenest and most vigorous plants are dug up for seed when the potatoes have reached about three-quarter growth. These potatoes are put in boxes, and left in the sun until they get thoroughly green and hard, when they are put away in a shed, where they will be secure from frost for the winter. They are examined about every ten days to see that they are not sprouting too much, and this is prevented by giving them more air, or moving them into a cooler position. It is advisable not to let them grow sprouts more than a quarter of an inch in length. Through getting these potatoes green and hard in the sun, when planted, wire worm and other pests will not interfere with them, and should the land be wet, they will not rot as other potatoes do. Also, when they are growing they are much stronger to resist frost. There is no comparison between seed saved in this manner and that saved from potatoes that have been allowed to ripen. Potatoes for this purpose must be lifted while they are in vigorous growth, and before any sign of blight appears, as once this disease has shown itself in the haulm the potatoes would not keep if dug green, as the spores from the leaves and the spores on the land immediately affect the tuber that is dug in an immature state. I have no hesitation in saying that the grower who carries out these instructions will increase his crop by at least 40 per cent.”

Improvement of Wheat-growing.

At a recent meeting of the Provisional Council of Agriculture a scheme for the betterment of the wheat-growing industry was submitted by Mr. H. C. Quodling (Director of Agriculture) for consideration by the Council. The Council approved of the general principles of the scheme, and, recognising the importance and urgency of giving effect to the proposals, authorised the Wheat and General Agricultural Standing Committee to take immediate action. With a view to the initiation of the proposals prior to the conclusion of the present season's planting operations, the Committee met the members of the State Wheat Board and Mr. R. E. Soutter (Manager, Roma State Farm) at a special meeting at Toowoomba.

The proposals submitted by the Director of Agriculture were adopted, and provided, briefly, as follows:—

- (1.) That the Wheat Board co-operate with the Department of Agriculture in encouraging the cultivation of certain types of wheat which combine desirable field characteristics with good milling and nutritive qualities, and in eliminating approximately two-thirds of the existing varieties which have proved less reliable;
- (2.) That the Wheat Board undertake the distribution of the supplies of seed wheat grown by the Department which have been proved rust resistant and reliable in regard to yields;
- (3.) That the approved varieties be distributed for planting in specified classes of soils only;
- (4.) That, subject to conditions laid down in regard to the cultivation of such varieties, the Wheat Board purchase on special terms the resultant crop of grain if suitable for seed purposes.

Seeing that the Board controls the purchase and sale of all Queensland-grown wheat, it was agreed that the operation of this scheme would effect a marked improvement in the wheat-growing industry, and that within a reasonable space of time high-class varieties specially suited to local conditions would be cultivated throughout the wheat-growing areas generally.

Organising Maizegrowers.

For many years there has been a steadily growing demand on the part of the maizegrowers of Queensland for some more organised method of marketing their produce. While the wheatgrowing areas are comparatively centralised, however, the centres of the maize industry are widely separated, large quantities being grown on the Atherton Tableland, and in the Burnett, the Downs, and other districts. It is thus apparent that the establishment of a central organisation to safeguard the interests of the whole of the growers of the State is a task of considerable magnitude. Some action, however, is urgently needed, and it will be of interest to the maizegrowers of Queensland to know that the problem in all its phases was considered by the Wheat and General Agriculture Committee of the Council of Agriculture at its first meeting in Toowoomba. After full discussion the Committee were of opinion that the problem is capable of solution, and that a complete organisation of the industry is possible. For the purpose of collecting full statistical information regarding production, it was agreed to ask the Department of Agriculture to circulate immediately a return form (approved by the Committee) on which growers will supply necessary details. When such information has been secured, the Committee propose to formulate a definite scheme for consideration by the Council of Agriculture.

Meat Ants as "Policemen."

Mr. Thos. Simond, Apple-Tree Creek, writes:—"I am only starting cane-growing, and have put in about an acre with hoe and mattock, and have noticed how quickly beef ants are on the job for wood grubs, worms, and other pests. Perhaps ants would be equally efficient as an aid to exterminating cane grubs."

Show Dates, 1922—

Show society secretaries are invited to forward for insertion in this list dates of forthcoming shows. Alterations of dates should be notified without delay.

Bundaberg: 1st to 3rd June.	Pine Rivers: 28th and 29th July.
Marburg: 2nd and 3rd June.	Wellington Point: 29th July.
Brookfield: 3rd June.	
Cairns: 7th and 8th June.	Sandgate: 4th and 5th August.
Gin Gin: 7th and 8th June.	Royal National: 7th to 12th August.
Woombye N.C.A.H.S.: 7th and 8th June.	Belmont: 19th August.
Mount Larcom: 9th and 10th June.	Murrumbidgee: 22nd to 24th August.
Gladstone: 15th and 16th June.	Coorparoo: 26th August.
Rockhampton: 22nd, 23rd, and 24th June.	Kenilworth: 31st August.
Esk: 28th and 29th June.	
Mundubbera: 29th and 30th June.	Beenleigh: 1st and 2nd September.
	Zillmere: 1st and 2nd September.
Mackay: 30th June and 1st July.	Gympie: 7th, 8th, and 9th September.
Gayndah: 4th, 5th, and 6th July.	Wynnum: 9th September.
Nambour: 5th and 6th July.	Imbil: 13th and 14th September.
Townsville: 5th and 6th July.	Laidley: 13th and 14th September.
Charters Towers: 12th and 13th July.	Sherwood: 16th September.
Gatton: 12th and 13th July.	Rocklea: 23rd September.
Proserpine: 13th, 14th, and 15th July.	Kilcoy: 28th and 29th September.
Rosewood: 19th and 20th July.	
Caboolture: 20th and 21st July.	Esk Camp Drafting: 4th and 5th October.
Mount Gravatt: 22nd July.	Pomona, 4th and 5th October.
Barcaldine: 25th and 26th July.	Southport: 6th October.
Crow's Nest: 26th July.	Enoggera: 7th October.

Biggenden District Agricultural and Pastoral Society: Thursday and Friday, 29th and 30th June, 1922.

BOWEN.—Bowen Pastoral, Agricultural, and Mining Association: F. Sellars, Secretary; Thursday and Friday, 27th and 28th July, 1922.

INGHAM.—The show dates of the Herbert River Agricultural Association have been altered to 11th and 12th August, 1922.

CERTIFICATES OF SOUNDNESS.

Certificates of Soundness were issued for the following Stallions during the month of May, 1922:—

Name of Stallion.	Breed.	Period for which Certificate was issued.	Owner's Name.	Owner's Address.
Battle Call ..	Blood	Life ..	E. J. Hayes ..	Harrisville
Warbelle ..	Blood	12 months	H. Weirer ..	Bright View, Lowood
Kim II. ..	Pony	Life ..	S. S. McCoombes	Church Hill, Ipswich
Black Eagle ..	Pony	Life ..	J. E. Hastings..	Silkstone, Ipswich
King Rufus ..	Pony	12 months	J. E. Reiser ..	Boonah
Colin Rufus ..	Trotter	Life ..	G. King ..	Salisbury road, Ipswich
Gold King ..	Trotter	12 months	W. Altmann ..	Glamorgan Vale, Ipswich

AN EXPERIMENT IN EGG PRODUCTION.

[From the "Journal of the Department of Agriculture," Union of South Africa.]

REPORT ON THE BUILDING UP OF TESTED LAYING STRAINS.

By J. J. JORDAAN, Poultry Instructor, Glen, Orange Free State.

This report gives my observations, conclusions, and remarks, and sets out the present position in connection with the experiment started at the Glen School of Agriculture in 1915-16 for building up tested laying strains of Speckled Sussex, White Wyandottes, and Silver Campines.

The accompanying table summarises the work done during the period 1st May, 1915, to 31st March, 1921, and while the actual output of eggs is only moderate, the lessons that have been learned are most valuable and form the first step towards the goal the experiment is intended to reach.

The Speckled Sussex and Silver Campines for the experiment were imported from England, and the White Wyandottes were procured from a South African breeder, as well as some other birds that were taken over from the Grootvlei Experiment Farm.

In-breeding of the closest possible nature was adopted up to the time dealt with by this report, so as to fix uniformity in all sections, such as type, colour, size, shape, and numbers in the eggs produced, as it was felt that these fixed characteristics could only be achieved by the above means. Very ordinary food was given the birds doing the test, anything of a forcing nature being most rigorously avoided; no meat or meatmeal was ever allowed, otherwise the numbers would doubtless have been considerably greater.

For the first year trap nests were used. In the second year the single pens were completed and occupied. These measure 20 ft. by 2 ft. 10 in., with house at the back 2 ft. 10 in. wide, 6 ft. deep, and 4 ft. 6 in. high, made of wood with galvanised iron roof. There is a wire-netting division in the house, each sixth division being of ceiling boards.

A nest is made of a paraffin box on its side, resting on bricks. On the top of the box is a bracket on which rests a perch; this passes through the wire-netting and, resting on the bracket on the box in the next run, serves as perching room for four birds, two in each run. The perch is removable, so is the nest, and the top of the nest (box) serves as a dropping board for the manure.

Water is provided in a small vessel suspended from the wire-netting division in the house above the roost. Admission to the house and run is through the back of the house, which is virtually the door.

Grain food is fed in a deep layer of litter on the floor of the house, the litter being kept in by a flap 12 in. high at the front and back of the house. Mash, green food, grit, charcoal, and lime food are given in a small paraffin tin, having hooks made of plain wire, suspended on the inside of the fence, at the front end of the run, a small hole being made in the wire-netting to admit the hand for this purpose. The tin is divided into three sections for mash and green food, grit and shell, and charcoal respectively.

From 1915 to 1919 attention was given solely to the three above-mentioned breeds, but in 1919-20 a start was made to test and build up the strains of some of the other breeds from the stock on the farm. Owing to the limited number of runs the following breeds only could be added:—Light Sussex, White Leghorns, Anconas, Barred Plymouth Rocks.

The result of the test with these, as far as it has gone, is also shown in the summary herewith.

To carry out the enlarged experiment meant placing two birds in a pen originally built for one, with resulting disadvantages, such as lower production, outbreak of vices, and earlier contamination of the soil in the runs. It was thought better, however, in the interests of the institution's stock as a whole to put up with these disabilities than to have no tested record of the producing ability of our breeding stock, for the constant purchase of birds from private breeders is not only expensive but certainly not conducive to the fixing of our own strains and their characteristics.

At the close of March last all the birds were removed from the pens to rest them for twelve months. The pens were dug over and sown with oats, it being intended to dig this crop in as green manure about September and then to resow with some other quick-growing plant which, in turn, will be again dug in about January, the runs to be again resown. It is thus hoped, by the end of next March to have the pens thoroughly fresh and as good as when first erected, if not better, and ready for another five years' occupation.

While a study of the summary shows nothing of a record, it reveals a marked improvement during the first four years in the production of the first three breeds started with, *i.e.*, in the number of eggs laid by the hens in each breed, both those laying the least and the most, together with the average of the numbers tested, showing an improvement each year. This is not quite so apparent or general in the case of the Speckled Sussex, yet improvement there is and of a marked nature, if the results of the first and fourth years (1915-16, 1918-19) are compared.

It is clear therefore that this method of testing and breeding to fix the characteristics aimed at in the strain, and of improving the general or average egg production of a flock or breed so as to render it a fixed strain, is sound.

The drop noticeable in the figures between the fourth and fifth years' records—1918-19 and 1919-20—is attributed to the following reasons:—

- (1) The ground in the runs was becoming stale, and this affected the health and stamina of the birds and also their resulting output.
- (2) In some cases signs were not wanting that a touch, or slight infusion of new blood, was being called for.
- (3) A rigorous selection, not of the largest producers to breed from the previous year as had been done formerly, but of those robust, typical, only moderate layers of good sized eggs in preference to those that gave quantity of eggs lacking size was needed.

It was felt, moreover, that the uniformity first mentioned in the report was fairly well established, and more attention could now be given to the size of eggs produced; that, no doubt, was the main contributory reason for this drop.

For various reasons it was thought best to close the test at the end of March last. Thus the last period was a test for nine months only, but, comparing the results of all the breeds and remembering the state of the ground in the runs, the

records—if taken *pro rata*—again show an improvement over those of 1919-20. The size of egg also improved in this period, due to the matings in 1918-19 and 1919-20.

In spite of the handicaps mentioned, if the twelve-month record for 1915-16 and the nine-month record for 1920-21 are compared *pro rata*, a slight improvement is found, but that is nothing when the general uniformity of the birds and of the eggs now laid are considered.

There now exists in the three breeds first started with a firm foundation in certain fixed characteristics and uniformity. With the discriminate infusion of a little new blood this year, it is anticipated that the next five years' tests on fresh ground, and some knowledge of what is being bred from, will maintain the uniformity that has been fixed, and that the quantity of output will be further improved, but, it is hoped, not at the expense of the size of egg which, for the last two years, has been mainly kept in view.

It is yet too early to remark upon the results of the other four breeds being tested, than to say that the setback in the second year in the Light Sussex is inexplicable, except that the male bird used the first year was purely a show bird and lacked egg-producing qualities, which did not appear to be the case on external characteristics.

SUMMARY.

Year.	Breed and Variety.	No. of Hens completed Test.	Lowest Output from a Hen.	Highest Output from a Hen.	Average Output from Flock.	Remarks.
1915-16	Speckled Sussex.	10	47	140	93.4	Imported stock.
1916-17		3	61	101	82.66	First Progeny.
1917-18		10	83	201	135.6	Progeny of above.
1918-19		8	114	154	135	Progeny of above.
1919-20		12	63	132	101.75	Two birds started to a pen. Selection for improvement in size of egg started.
1920-21		12	25 *(cull)	106	70.92	Nine months' record only.
1915-16	White Wyandottes.	11	76	145	112.73	New stock started with.
1916-17		5	97	145	115.2	Birds bred on farm from above.
1917-18		9	112	196	161	Progeny from above.
1918-19		11	152	210	178.36	Two birds started to a pen. Selection for improvement in size of egg started.
1919-20		9	87	177	124.33	
1920-21		11	77	145	107.36	
1915-16	Silver Campines.	12	29	118	67.75	Imported stock.
1916-17		6	56	115	84.33	First progeny.
1917-18		8	94	181	128.12	Progeny from above.
1918-19		11	125	204	164.91	Selection for improvement in size of egg started. Two birds started in a pen.
1919-20		10	22†	179	122.2	
1920-21		7	54	113	95	
1918-19	Light Sussex.	3	166	212	193.33	Birds exchanged, origin unknown.
1919-20		11	50	85	64.36	Progeny of above.
1920-21		4	58	75	67	Progeny of above. Nine months' record only.
1919-20	White Leghorns.	20	142	210	172.55	Bred on farm.
1920-21		23	80	157	121.7	Progeny of above. Nine months' record only.
1920-21	Anconas.	5	101	122	114	Bred on farm. Nine months' record only.
1920-21	Barred Plymouth Rocks.	5	88	128	111.6	Bred on farm. Nine months' record only.

* Purposely tested to demonstrate that culls are useless to keep for students' education.

† Ruptured oviduct. Kept for same purpose as culled Speckled Sussex above.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1922.

The nineteenth egg-laying competition held at the Q.A. College commenced on 3rd April. The competing pens number 70, 44 competing in the light section and 26 in the heavy section. In the case of 40 pens the birds are being tested singly, 28 being light and 12 heavy breeds. The following are the individual records:—

Competitors.	Breed.	April.
LIGHT BREEDS.		
*Bathurst Poultry Farm ...	White Leghorns ...	112
*W. and G. W. Hindes ...	Do. ...	108
J. H. Jones ...	Do. ...	104
*Geo. Trapp ...	Do. ...	104
J. Purnell ...	Do. ...	101
*S. L. Grenier ...	Do. ...	97
H. G. C. Wenck ...	Do. ...	97
B. Hawkins ...	Do. ...	97
*W. A. Wilson ...	Do. ...	92
*O. Goos ...	Do. ...	92
*G. Williams ...	Do. ...	83
*T. Fanning ...	Do. ...	80
B. C. Bartlem ...	Do. ...	80
*Mrs. E. White ...	Do. ...	77
*N. A. Singer ...	Do. ...	76
A. Martin ...	Do. ...	73
C. H. Singer ...	Do. ...	72
A. Anders ...	Do. ...	70
E. Stephenson ...	Do. ...	69
*H. Fraser ...	Do. ...	65
*J. W. Short ...	Do. ...	63
*J. W. Newton ...	Do. ...	62
*W. Becker ...	Do. ...	60
Brampton Poultry Farm ...	Do. ...	59
*C. M. Pickering ...	Do. ...	59
*H. P. Clarke ...	Do. ...	56
E. Symons ...	Do. ...	56
T. H. Craig ...	Do. ...	56
G. H. Richardson ...	Do. ...	55
*R. C. Cole ...	Do. ...	55
*Mrs. L. Anderson ...	Do. ...	54
*C. Goos ...	Do. ...	54
N. J. Nairn ...	Do. ...	52
*J. M. Manson ...	Do. ...	52
*E. A. Smith ...	Do. ...	44
*R. Gill ...	Do. ...	40
*Oakleigh Poultry Farm ...	Do. ...	38
*R. C. J. Turner ...	Do. ...	36
H. Trappett ...	Brown Leghorn ...	34
*M. F. Newberry ...	White Leghorns ...	33
*Mrs. R. E. Hodge ...	Do. ...	29
*F. Birchall ...	Do. ...	29
*Thos. Taylor ...	Do. ...	6
Parisian Poultry Farm ...	Brown Leghorn ...	0
HEAVY BREEDS.		
J. Hutton ...	Black Orpingtons ...	130
Mrs. A. Kent ...	Do. ...	128
Wombo Poultry Farm ...	Do. ...	120
*A. E. Walters ...	Do. ...	113
*R. Holmes ...	Do. ...	97

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	April.
HEAVY BREEDS— <i>continued.</i>		
*R. Burns	Black Orpingtons ...	86
*Rev. A. McAllister	Do.	82
*Jas. P. tier	Do.	80
V. J. Rye	Do.	72
Mrs. L. Maund	Do.	72
Mrs. A. E. Gallagher	Do.	71
H. B. Stephens	Do.	61
*H. M. Chaille	Do.	60
Jas. Hitchcock	Do.	59
R. Innes	Do.	51
*T. Hindley	Do.	44
*E. F. Dennis	Do.	34
*Parisian Poultry Farm	Do.	33
C. Rosenthal	Do.	23
W. Becker	Chinese Langshans ...	16
W. C. Trapp	Black Orpingtons ...	12
C. Doan	Do.	12
*J. E. Smith	Barred Rocks	11
*C. C. Dennis	Black Orpingtons ...	1
*Miss L. Hart	Rhode Island Reds ...	1
R. Burns	Silver-laced Wyandottes	0
Total ... ..	...	4,300

* Indicates that the pen is being tested singly.

DETAILS OF SINGLE TEST PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
Bathurst Poultry Farm	14	16	17	23	23	19	112
W. and G. W. Hindes	19	17	20	15	18	19	108
G. Trapp	18	7	21	18	18	22	104
S. L. Grenier	14	13	16	17	17	20	97
O. Goos	16	11	12	24	15	14	92
W. A. Wilson	14	12	12	19	20	15	92
G. Williams	13	13	19	12	12	14	83
T. Fanning	16	14	8	17	18	7	80
E. White	20	10	8	9	17	13	77
N. A. Singer	5	10	17	21	10	13	76
H. Fraser	11	17	11	14	6	6	65
J. W. Short	16	9	10	18	1	9	63
J. W. Newton	15	16	8	5	13	5	62
W. Becker	0	6	19	14	5	16	60
C. P. ckerling	11	15	11	4	10	8	59
H. P. Clarke	14	0	12	5	15	10	56
R. C. Cole	7	16	21	4	2	5	55
C. Goos	9	5	6	9	7	18	54
Mrs. L. Andersen	10	1	8	15	10	10	54
J. M. Manson	15	4	5	6	14	8	52
E. A. Smith	12	2	9	11	2	8	44
R. Gill	9	3	3	2	7	16	40
Oakleigh Poultry Farm	0	1	1	11	5	20	38
R. C. J. Turner	4	0	13	10	3	6	36
M. F. Newberry	3	2	10	14	3	1	33
Mrs. R. Hodge	11	0	2	9	2	5	29
F. Birchall	1	4	2	10	3	9	29
Thos. Taylor	1	0	2	2	0	1	6

DETAILS OF SINGLE TEST PENS—*continued*.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
A. E. Walters	21	13	23	17	23	16	113
R. Holmes	11	24	9	19	14	20	97
R. Burns	17	12	5	22	14	16	86
Rev. A. McAllister ..	15	20	20	9	6	12	82
J. Potter	6	17	16	23	17	1	80
H. M. Chaille	18	6	16	20	0	0	60
T. Hindley	0	1	2	20	19	2	44
E. F. Dennis	0	0	18	2	2	12	34
Parisian Poultry Farm ..	2	11	3	6	1	10	33
C. C. Dennis	0	1	0	0	0	0	1
Miss L. Hart	0	0	1	0	0	0	1
J. E. Smith	0	2	7	0	0	2	11

CUTHBERT POTTS,
Principal.

**THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE,
GATTON.**

MILKING RECORDS OF COWS FOR APRIL, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Gay Lassie ...	Ayrshire ...	20 Feb., 1922	1,080	4.5	57.00	
Prim ...	Holstein ...	9 F.b. "	1,200	3.5	48.90	
Little Buttercup...	" ..	12 D c., 1921	960	4.0	45.00	
Snowflake ...	Shorthorn...	20 Feb., 1922	840	4.3	42.30	
College Cold Iron	Jersey ...	25 Jan. "	660	5.0	39.00	
Magnet's Leda ...	" ..	8 F.b. "	720	4.6	39.00	
Lute ...	Ayrshire ...	8 Jan. "	840	3.8	37.50	
Skylark ...	" ..	7 Feb. "	870	3.7	37.50	
Auntie's Lass ...	" ..	31 Oct., 1921	750	3.7	32.40	
Lady Annette ...	" ..	2 Jan., 1922	660	4.2	32.40	
Hedges Madge ...	Holstein ...	15 Aug., 1921	660	4.2	32.40	
Lilia ...	Ayrshire ...	3 Mar., 1922	690	3.9	31.20	
Buttercup ...	Shorthorn...	28 Oct., 1921	720	3.3	30.00	
Thyra of Myrtle-view	Ayrshire ...	31 July, "	570	4.2	28.20	
Glow VI. ...	Guernsey ...	28 Aug. "	450	5.2	27.60	
College Ma Petite	Jersey ...	5 Feb., 1922	570	4.1	27.30	
College Bluebell ...	" ..	22 Oct., 1921	510	4.2	26.70	
College St. Margaret	" ..	25 Sept. "	420	5.2	25.80	
College Evening Glow	" ..	10 Oct. "	450	4.9	25.80	
Lady Meg ...	Ayrshire ...	25 Jan., 1922	570	3.8	25.50	
College Wildflower	Jersey ...	10 Dec., 1921	450	4.8	25.20	
Lady Mitchell ...	Holstein ...	21 Dec. "	510	4.2	25.20	
College Prima Donna	" ..	17 Nov. "	630	3.4	24.90	
College Nita ...	" ..	26 Feb., 1922	570	3.4	22.50	
Miss Security ...	Ayrshire ...	20 Aug., 1921	510	3.7	21.90	
Lady Loch II. ...	" ..	31 Jan., 1922	450	4.0	21.00	

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL, 1922 AND 1921, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	April.	No. of Years' Records.	April, 1922.	April, 1921.		April.	No. of Years' Records.	April, 1922.	April, 1921.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton	4·67	21	2·14	11·59	Nambour	5·08	26	1·36	11·52
Cairns	12·20	40	11·85	19·72	Nanango	1·87	40	0·07	1·94
Cardwell	9·86	50	3·92	3·38	Rockhampton ...	2·29	35	0·78	1·21
Cooktown	9·24	46	7·68	5·99	Woodford	4·24	35	0·88	8·94
Herberton	4·43	35	1·89	7·64					
Ingham	9·00	30	4·58	3·07					
Innisfail	21·90	41	10·27	19·93					
Mossman	12·46	14	6·13	11·86					
Townsville	3·90	51	0·27	0·32					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr	2·94	35	0·02	0·31	Dalby	1·26	52	Nil	0·15
Bowen	2·95	51	0·13	0·23	Emu Vale	1·20	26	0·05	1·27
Charters Towers ...	1·80	40	0·05	0·27	Jimbour	1·30	34	Nil	0·19
Mackay	6·86	51	2·54	3·20	Miles	1·42	37	Nil	0·13
Proserpine	6·92	19	2·51	4·89	Stanthorpe	1·71	49	0·49	1·48
St. Lawrence	2·84	51	0·61	0·44	Toowoomba	2·51	50	0·24	3·27
					Warwick	1·67	57	0·05	1·17
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden	1·78	23	0·09	4·01	Roma	1·28	48	Nil	Nil
Bundaberg	2·94	39	0·50	8·81					
Brisbane	3·59	71	0·27	8·06					
Childers	2·53	27	0·57	8·47					
Crohamhurst	5·70	30	1·72	14·66					
Esk	2·69	35	0·07	4·85					
Gayndah	1·32	51	Nil	1·07					
Gympie	3·15	52	0·30	6·76					
Glasshouse M'tains	5·18	14	...	9·31					
Kilkivan	2·11	43	Nil	3·69					
Maryborough	3·37	51	0·12	9·76					
					<i>State Farms, &c.</i>				
					Bungeworgorai ...	0·86	8	Nil	0·01
					Gatton College ...	1·69	23	0·02	1·83
					Gindie	1·24	23	Nil	0·08
					Hermitage	1·32	16	0·03	0·64
					Kairi	5·55	8	3·01	14·70
					Sugar Experiment				
					Station, Mackay	5·43	25	2·15	2·76
					Warren	1·34	8	Nil	0·85

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

Orchard Notes for July.

THE COAST DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded, good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to fix standards of quality and see that the fruit offered for sale complies with the standards prescribed and that the cases are marked accordingly.

Where the crop has been gathered, the trees can be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning out of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated, do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree, cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree, and when the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer parts a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that can be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

Citrus trees can be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

Land intended for bananas and pineapples can be got ready, and the existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for sending South can be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales, when they may be injured by the cold.

The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from black heart (the result of a cold winter) or from fruitlet core rot, they can well, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former, and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing, well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before spring growth starts.

With regard to pruning, follow the advice given in the June number; and if you are not thoroughly conversant with the work, get the advice of one or other of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out, it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruit on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth, and on spurs; but peaches and nectarines always on wood of the previous season's growth, as once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees can be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting can be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

Farm and Garden Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine, and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—i.e., when about one-third of the plants in the crop are in flower.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, holly-hocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberose, amaryllis, paneratum, ismene, erinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6.2	5.50	6.18	5.20	6.36	5.3
2	6.3	5.49	6.18	5.19	6.36	5.3
3	6.3	5.48	6.19	5.18	6.37	5.3
4	6.4	5.47	6.20	5.17	6.37	5.3
5	6.5	5.45	6.21	5.17	6.38	5.2
6	6.5	5.44	6.22	5.16	6.38	5.2
7	6.6	5.43	6.22	5.16	6.39	5.2
8	6.6	5.42	6.23	5.15	6.39	5.2
9	6.7	5.41	6.23	5.14	6.40	5.2
10	6.7	5.40	6.24	5.14	6.40	5.2
11	6.8	5.39	6.25	5.13	6.41	5.2
12	6.8	5.38	6.25	5.13	6.41	5.2
13	6.9	5.37	6.26	5.12	6.42	5.2
14	6.9	5.36	6.26	5.12	6.42	5.2
15	6.10	5.35	6.27	5.11	6.42	5.3
16	6.10	5.34	6.27	5.10	6.42	5.3
17	6.11	5.33	6.28	5.10	6.42	5.3
18	6.11	5.32	6.28	5.9	6.43	5.3
19	6.12	5.31	6.29	5.9	6.43	5.4
20	6.12	5.30	6.29	5.8	6.43	5.4
21	6.13	5.29	6.30	5.8	6.43	5.4
22	6.13	5.28	6.31	5.7	6.43	5.4
23	6.14	5.27	6.31	5.7	6.43	5.4
24	6.14	5.26	6.32	5.6	6.44	5.4
25	6.15	5.25	6.32	5.6	6.44	5.4
26	6.15	5.24	6.33	5.5	6.44	5.5
27	6.16	5.23	6.33	5.5	6.44	5.5
28	6.16	5.22	6.34	5.4	6.44	5.5
29	6.17	5.22	6.34	5.4	6.44	5.5
30	6.17	5.21	6.35	5.3	6.44	5.6
31	...	...	6.35	...	...	...

PHASES OF THE MOON, OCCULTATIONS, &c

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer Time" is not used.

H. M.

5 April (First Quarter 3 46 p.m.
 12 " ○ Full Moon 6 44 a.m.
 19 ") Last Quarter 10 54 a.m.
 27 " ● New Moon 3 4 p.m.

Perigee on 10th at 6.36 p.m.

Apogee on 22nd at 8.12 p.m.

The moon will pass, apparently, close to Jupiter on the 11th soon after sunset. If viewed from a higher southern latitude the moon will be seen to occult the planet.

4 May (First Quarter 10 56 p.m.
 11 " ○ Full Moon 4 6 p.m.
 19 ") Last Quarter 4 17 a.m.
 27 " ● New Moon 4 4 a.m.

Perigee on 8th at 5.12 p.m.

Apogee on 20th at 2.30 p.m.

On the 8th, between 11 and 12 p.m., the moon will be again very near, apparently, to Jupiter in the constellation Virgo, with the very interesting binary star—Gamma Virginis—slightly below them.

3 June (First Quarter 4 10 a.m.
 10 " ○ Full Moon 1 38 a.m.
 17 ") Last Quarter 10 3 p.m.
 25 " ● New Moon 2 20 p.m.

Perigee on 4th at 5.12 a.m. and on 29th at 1.24 p.m.

Apogee on 17th at 9.18 a.m.

The moon will pass Saturn on the 4th at a quarter past three in the afternoon, and will enable this planet to be seen in the daytime if a small telescope or binoculars are directed about six times the moon's diameter northward. It will also pass Jupiter on the 5th a little before four o'clock in the morning, again in apparent proximity to Gamma Virginis. Jupiter will again be occulted in high southern latitudes.

Venus, Jupiter, and Saturn will be evening stars during these three months. Mars will be somewhat later in rising, but will be visible early in the evening during the latter part of the period.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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